

(Magnetic Resonance Cholangiopancre-
atography; MRCP)
Sense encoding (SENSE) 3
: 2003 8 1 MRCP 141 . MRCP
3
(Computed Tomography; CT
)
4가 가
: 141 135 69
(51%) . 85%
(=0.94). 4가
3 가
, 3 (p <0.01).
: MRCP 가

MRCP T2
Sensitivity encoding (SENSE) 3
가 .
(Endoscopic Retrograde Cholangio-
pancreatography; ERCP) MRCP SENSE
3
가 (1-4). 가
ERCP 가
가 2003 8 1 MRCP 141
(5). 가 77 , 가 58
가 54.9 (18-91)
ERCP 1.5 T (Philips
(3, 6) Medical Systems, Intera, The Netherlands)

3-5 mm, 20, 12, 12, TR/TE 9000/1200 msec, (flip angle) 90°, (field of view, FOV) 250mm, (matrix) 256 × 512, (slice thickness) 40 mm, (number of signal average, NSA) 2, 1, 21

SENSE, 3, 가, TR, T2 (TR/TE= 1800/700 msec), 64, 2, 90°, 260 mm, 256 × 512, 1 mm, TSE 110, start-up echo 47, Water fat shift (WFS) 0.517, Spectra Presaturation with Inversion Recovery (SPIR), SENSE 2, 1, 57, T2

12, 12, MRCP, 가, 가, 가, (n=58), (; n=93, CT; n=91)

가 0.75, 가, 가, chi-square (χ^2), test

141, 5, CT, MRCP, 135, 69, MRCP, 4가, 1, 85%, 2, 가 0.94, 85%

Table 1. Comparison of Four Different MR Techniques in the Evaluation of Gallstones

	SSTSE		3DTSE	
	source axial image	coronal image	source coronal image	MIP image
Accuracy (%)	85	70	86	56

(Fig. 1). 4가, 70%, 85%, 3, 86%, 56%, MRCP 4가, 3, 가, 3, ($p < 0.01$) (Table 1)

(Fig. 2). CT, 가, 가, (7), CT, 가, 84 - 100%, 66 - 93%, (8 - 10).

가 (8), MRCP 1986, Dooms, 가 81 - 100%, 85 - 100%, 89 - 100%, ERCP, (11).

가, 가, 가, (1, 12), MRCP, Calvo (13), (14), Calvo HASTE (half - Fourier acquisition single - shot turbo spin - echo), MRCP, 97.7%, HASTE, RARE (rapid acquisition with relaxation enhance - ment)

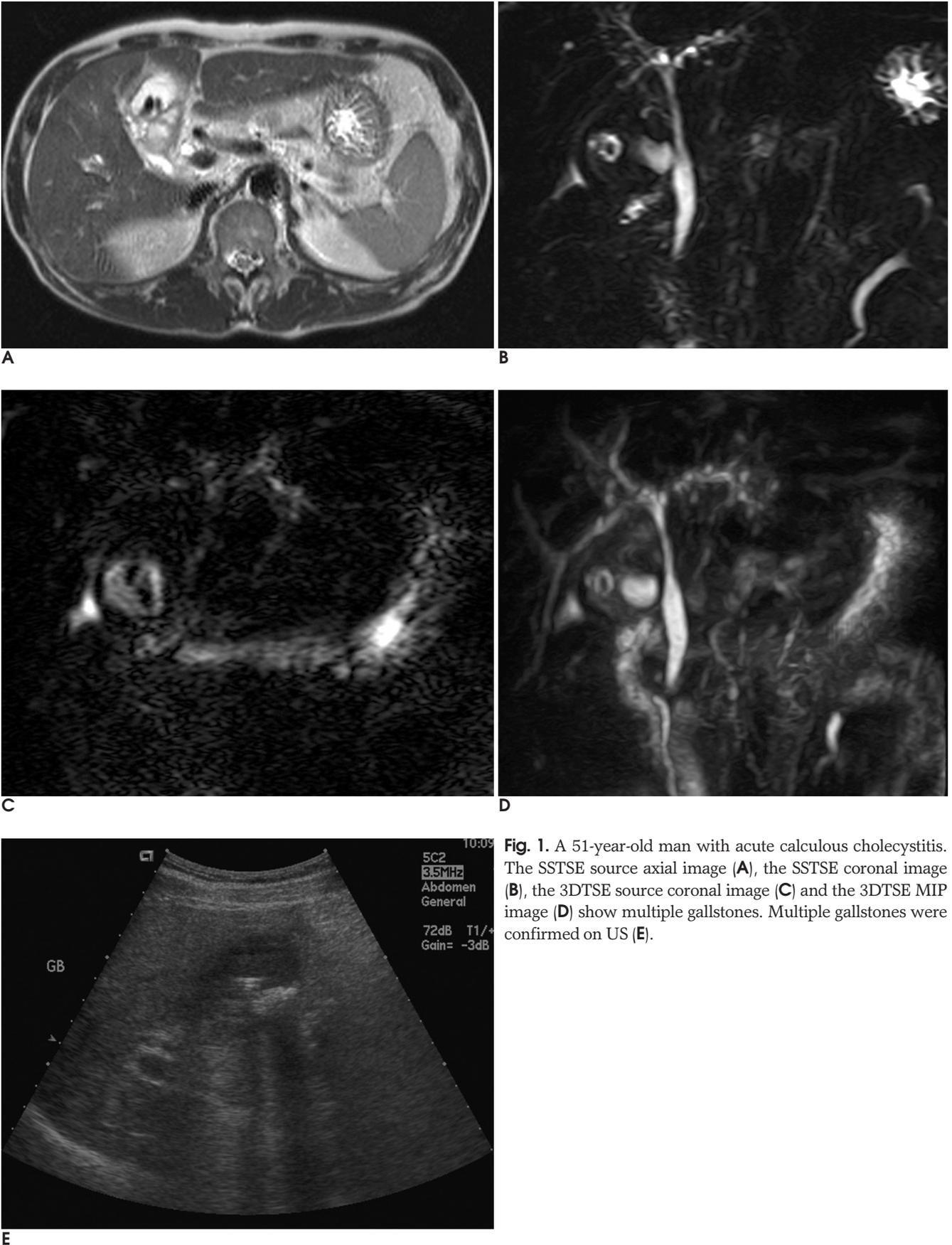


Fig. 1. A 51-year-old man with acute calculous cholecystitis. The SSTSE source axial image (A), the SSTSE coronal image (B), the 3DTSE source coronal image (C) and the 3DTSE MIP image (D) show multiple gallstones. Multiple gallstones were confirmed on US (E).

MRCP가
가
(4).
,
HASTE
가
(15, 16). HASTE single - shot RARE
(6).
3
가
(17).
가
CT
,
가
가
MRCP
SENSE
가 가
3
1. Coakley F, Schwartz L. Magnetic resonance cholangiopancreatography. *J Magn Reson Imaging* 1999;9:157-162
2. Gallix BP, Rengent D, Bruel JM. Use of magnetic resonance cholangiography in the diagnosis of choledocholithiasis. *Abdom Imaging* 2001;26:21-27
3. Boraschi P, Neri E, Braccini G, Gigoni R, Caraemlla D, Perri G.

Choledocholithiasis: diagnostic accuracy of MR cholangiopancreatography. Three-year experience. *Magn Reson Imaging* 1999;17:1245-1253
4. Aube C, Delorme B, Yzet T, Burtin P, Jerome L, Pessaux P, et al. MR cholangiopancreatography versus endoscopic sonography in suspected common bile duct lithiasis: a prospective, comparative study. *AJR Am J Roentgenol* 2005;184:55-62
5. Bret PM, Reinhold C. Magnetic resonance cholangiopancreatography. *Endoscopy* 1997;29:472-486
6. Lee M-G, Jeong Y-K, Kim M-H, Lee S-G, Kang E-M, Chien D, et al. MR cholangiopancreatography of pancreaticobiliary disease: comparing single-shot RARE and multislice HASTE sequences. *AJR Am J Roentgenol* 1998;171:1539-1545
7. D. Pickuth. Radiologic diagnosis of common bile duct stones. *Abdom Imaging* 2000;25:618-621
8. Hessler PC, Hill DS, Detorie FM, Rocco AF. High accuracy sonographic recognition of gallstones. *AJR Am J Roentgenol* 1980;136:517-520
9. Havrilla TR, Reich NE, Haaga JR, Seidelmann FE, Cooperman AM, Alfidi RJ. Computed tomography of the gallbladder. *AJR Am J Roentgenol* 1978;130:1059-1067
10. Barakos JA, Ralls PW, Lapin SA, Jonson MB, Radin DR, Coletti PM, et al. Cholelithiasis: Evaluation with CT. *Radiology* 1987;162:415-418
11. Varghese JC, Liddell RP, Farrell MA, Murray FE, Osborne DH, Lee MJ. Diagnostic accuracy of magnetic resonance cholangiopancreatography and ultrasound compared with direct cholangiography in the detection of choledocholithiasis. *Clinical Radiology* 2000;55:25-35
12. Reinhold C, Taourel P, Bret PM, Cortas GA, Mehta SN, Barkun AN, et al. Choledocholithiasis: evaluation of MR cholangiography for diagnosis. *Radiology* 1998;209:435-442
13. Calvo MM, Bujanda L, Heras I, Calderon A, Cabriada JL, Orive V, et al. Magnetic Resonance cholangiography versus ultrasound in the evaluation of the Gallbladder. *J Clin Gastroenterol* 2002;34:233-236
14. 2000;42:497-503
15. Becker CD, Grossholz M, Becker M, Mentha G, De Peyer R, Terrier F. Choledocholithiasis and bile duct stenosis: diagnostic accuracy of MR cholangiopancreatography. *Radiology* 1997;205:523-530
16. (SS-TSE) SENSE
3 (3D-TSE)
2003;49:483-488
17. 가.
2001;44:577-582

The Detection of Gallstones on MR Cholangiopancreatography: Comparison between the Single-Shot Turbo Spin-Echo Pulse Sequence and the Three-Dimensional Turbo Spin-Echo Pulse Sequence with the SENSE Technique¹

Ju Ae Kim, M.D., Eun Joo Yun, M.D., Chul Soon Choi, M.D., Dae Young Yoon, M.D.,
Sang Joon Park, M.D., Young Lan Seo, M.D., Yu-Jin Lee, M.D., Jeung Hee Moon, M.D.

¹Department of Radiology, Hallym University College of Medicine

Purpose: We wanted to evaluate the detectability of gallstones on magnetic resonance cholangiopancreatography (MRCP) and to compare the accuracy between the single-shot turbo spin-echo (SSTSE) sequence and the three-dimensional turbo spin-echo (3DTSE) sequence with the sensitivity encoding (SENSE) technique.

Materials and Methods: A total of 141 patients who had undergone MRCP for a year period since August, 2003 were involved in the study. The source axial-SSTSE, coronal-SSTSE, source coronal-3D TSE and maximum intensity projection (MIP)-3DTSE images were obtained. Based on the operative findings and the findings of the ultrasound and CT examinations, the results of the reading by two investigators for the presence of gallstones were compared and analyzed.

Results: Among 141 patients, 135 patients were included in the study. 69 cases (51%) were found to have gallstones. In terms of detection of gallstones, the accuracy was 85%. The reading by one investigator greatly accorded with that of the other investigator ($\kappa = 0.94$). As a result of comparing the four kinds of images obtained with the different techniques, it was found that gallstones were seen best on the source axial-SSTSE and source coronal-3DTSE images; the coronal-SSTSE image was the next best image and the MIP-3DTSE image followed ($p < 0.01$).

Conclusion: The detectability of gallstones on MRCP was relatively excellent and the source axial-SSTSE and source coronal-3DTSE imagings should be included for the detection of gallstones.

Index words : Magnetic resonance (MR)
Gallbladder
Gallstone

Address reprint requests to : Eun Joo Yun, M.D., Department of Radiology, Hallym University, Kangdong Sacred Heart Hospital,
445 Gil-Dong, Kangdong-gu, Seoul, 134-701, Korea.
Tel. 82-2-2224-2305 Fax. 82-2-488-7370 E-mail: yeunjookr@yahoo.co.kr