

가 1

.

: (MR cholangiography)

가

: 1999 3 2000 6

15

(n=6),

(n=5),

(n=1),

(n=3)

가

(n=2), Endocoil

(n=3), Ultraflex

Diamond

(n=5)

Wallstent(n=5)

1/3

1

, 1/3 - 2/3

2 , 2/3

3

, 가

: Endocoil

1.7 - 3 (, 2.3),

1.7 - 2.3 (, 2

), Ultraflex Diamond

1 - 3 (, 1.7)

2/3

. Wallstent 1 - 1.7 (, 1.3)

가

가

: Wallstent

가 가

가

MR

가

MR

(1 - 6).

가

가

(7).

(10, 11).

, CT, (percutaneous transhepatic cholangiography, PTC),

(endoscopic retrograde cholangiopancreatography, ERCP) (2, 3).

PTC ERCP

,

CT

(7).

(MR cholangiography,

MRC

)

MRC 가

Easy Wallstent(Schneider, Buelach,

Switzerland)

Smart Stent(Cordis, Miami,

U.S.A.) 2

MRC 가

Merkle (7)

가

Wallstent 3

MRC

16

MRC

MRC

가

(8, 9).

MRC

(magnetic susceptibility artifact)

가

1999 10

2000 6

MRC

16

2002 4 19

2002 7 5

가

:

MRC ERCP 가 25

1 15 가

가 7 가 8 ,

42 - 77 67 ,

(n=1), (n=3) , (n=6), (n=5), 가

3 4 ERCP 1/3

8 (bile cytology) 1 , 1/3 - 2/3 2 , 2/3 3

가 MRC 가 ERCP

(Taewoong, Seoul, Korea)(n=2), , MRC

Endocoil (Medtronic, Minneapolis, U.S.A.)(n=3), MRC ERCP

Ultraflex Diamond (Microvasive, Boston, U.S.A.)(n=5) 0 - 15 (, 4.3) .

Wallstent(Microvasive, Boston, U.S.A.)(n=5) 15 가

MR 1.5T MR (Magnetom Vision, Siemens, Erlangen, Germany) 6 , 가

(phase-array surface coil) . MRC 9 .

half Fourier single-shot turbo spin echo(HASTE) (coronal), (oblique coronal), (axial)

4 - 5 mm , 4 - 7 mm 1.7 - 3 (, 2.3), 1.7 2.3

2 MIP(maximum intensity projection) 3 (, 2), Ultraflex Diamond 1 - 3 (

3 (field of view) 2/3 (Figs. 1, 2).

30 - 35 cm , Wallstent 1 - 1.7 (, 1.3) 가

(imaging 가 (Fig. 3).

parameter) TR/TEeff가 /95, 가 13, 가

1 , 176 - 224 × 256, 11.9 가 가 , 가

msec, 20 가 가 Diamond 2 ; 9 3 (Ultraflex MRC

1 가 , 가

Table 1. Results in 15 Patients with MR Cholangiography for Follow-up Examination after Metallic Stent Placement in the Bile Duct

Patient	Age/Sex	Type of Stent	Disease	Score of Luminal Diameter in MRC	Location of Metallic Stent(Distal portion)	Duration between MRCP and ERCP (Days)
1	71/M	Endocoil	CBD* ca [†]	2.3	Bile duct	6
2	73/F	Endocoil	Pancreas head ca	3	Duodenum	15
3	68/F	Endocoil	Pancreas head ca	1.7	Duodenum	0
4	52/M	Nitinol	Gallbladder ca	2.3	Duodenum	3
5	73/F	Nitinol	CBD ca	1.7	Duodenum	0
6	64/M	Diamond [‡]	Hilar cholangioca	2.3	Bile duct	2
7	66/F	Diamond	Hilar cholangioca	3	Bile duct	6
8	77/M	Diamond	Hilar cholangioca	1.3	Duodenum	2
9	76/F	Diamond	CBD ca	1	Duodenum	15
10	72/F	Diamond	CBD ca	1	Duodenum	2
11	76/F	Wallstent	Pancreas head ca	1.7	Duodenum	3
12	65/M	Wallstent	CBD ca	1	Bile duct	0
13	60/M	Wallstent	Hilar cholangioca	1	Bile duct	1
14	67/F	Wallstent	Hilar cholangioca	1.7	Duodenum	4
15	42/M	Wallstent	Hilar cholangioca	1	Bile duct	5

CBD* = common bile duct, ca[†] = cancer, Diamond[‡] = Ultraflex Diamond stent

가 , 가 가 가 1.2 Ultraflex
가 가 Diamond 가 1.7
(Fig. 4). Ultraflex Diamond 가

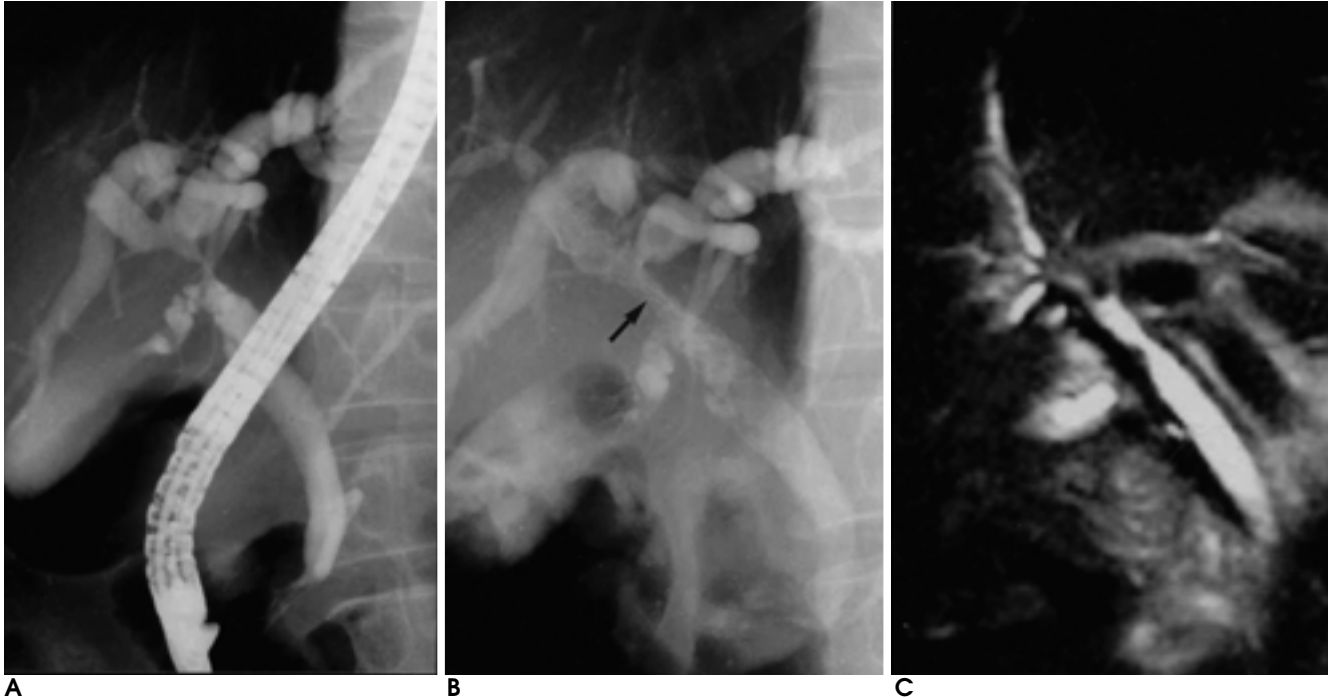


Fig. 1. A 66-year-old woman with hilar cholangiocarcinoma.

A. Endoscopic retrograde cholangiopancreatography (ERCP) shows strictures of right and left hepatic ducts, and common hepatic duct.

B. ERCP shows Ultraflex Diamond stent implanted in intra- and extrahepatic bile ducts. Focal narrowing of common hepatic duct due to mass is noted (arrow).

C. MR cholangiography after insertion of metallic stent is well correlated with ERCP (B). Metallic stent does not induce artifact.



Fig. 2. A 76-year-old woman with common bile duct cancer.

A. ERCP shows Ultraflex Diamond stent implanted in the extrahepatic bile duct.

B. MR cholangiography shows inadequate visualization of inner lumen of biliary stent (arrows).

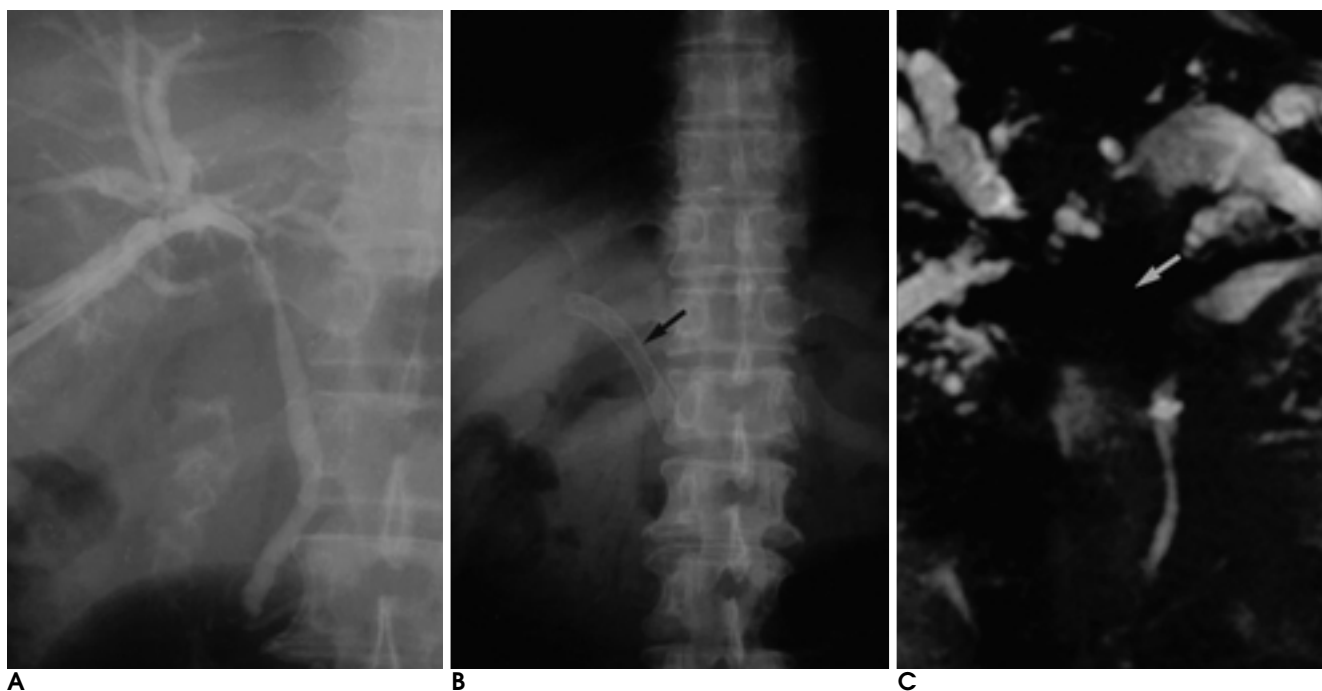


Fig. 3. A 42-year-old man with hilar cholangiocarcinoma.

A. Percutaneous transhepatic cholangiography shows irregular luminal narrowing of intra- and extrahepatic bile ducts.

B. Abdominal plain radiography shows a metallic stent (Wallstent) in right upper quadrant (arrow).

C. MR cholangiography shows signal void of stent lumen due to susceptibility artifact (arrow).

[illegible]

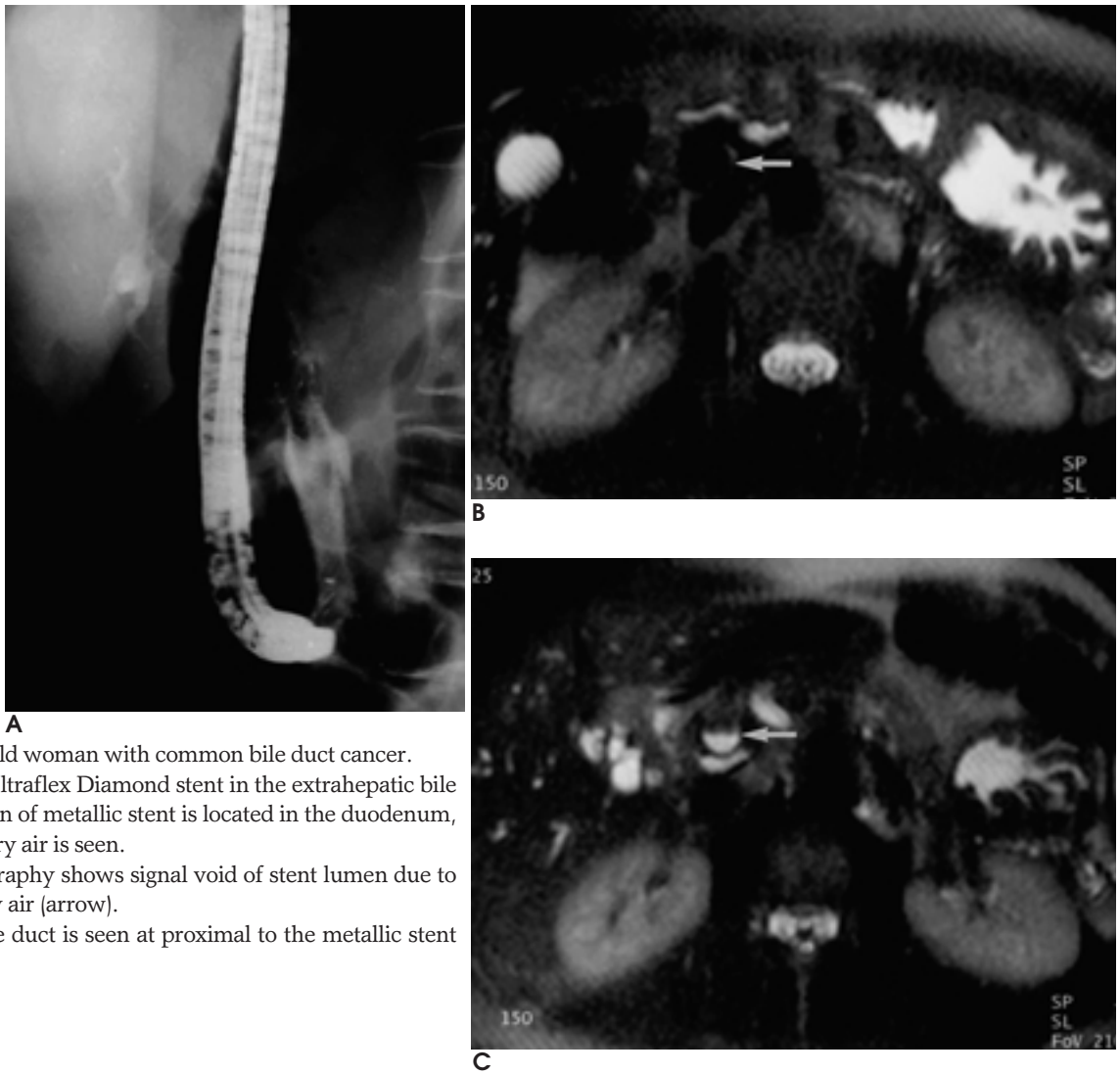


Fig. 4. A 72-year-old woman with common bile duct cancer.
A. ERCP shows Ultraflex Diamond stent in the extrahepatic bile duct. Distal portion of metallic stent is located in the duodenum, and multiple biliary air is seen.
B. MR cholangiography shows signal void of stent lumen due to artifact and biliary air (arrow).
C. Air-fluid in bile duct is seen at proximal to the metallic stent (arrow).

가

MRC가

가

가

MRC

MRC

가

2/3

MRC

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Utility of MR Cholangiography for Follow-up Examination after Metallic Stent Placement in the Bile Duct¹

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Purpose: To evaluate the efficacy of MR cholangiography for follow-up examination after metallic stent placement in the bile duct.

Materials and Methods: Between December 1999 and June 2000, 15 patients with biliary obstruction in whom metallic biliary stents had been placed underwent MR cholangiography during follow-up examination. The causes of obstruction were hilar cholangiocarcinoma ($n=6$), common bile duct cancer ($n=5$), gall bladder cancer ($n=1$) and pancreatic cancer ($n=3$). The types of self-expandable metallic stent employed were the nitinol stent ($n=2$), the Endocoil nitinol stent ($n=3$), the Ultraflexed Diamond stent ($n=5$), and the Wallstent ($n=5$). Using MR cholangiography, we measured the diameter of that part of the biliary stent which showed high signal intensity, assigning one point if this was less than one third of the stent diameter, two points if between one third and two thirds, and three points if more than two thirds. We decided that a higher score indicated fewer artifacts.

Results: The score was 1.7 - 3 (mean, 2.3) points for the Endocoil nitinol stent, 1.7 - 2.3 (mean, 2) for the nitinol stent, and 1 - 3 (mean, 1.7) for the Ultraflex Diamond stent. In most cases, two thirds of the stent diameter was observed. For the Wallstent, the score was 1 - 1.7 (mean, 1.3) points and the inner portion of the stent was almost invisible.

Conclusion: MR cholangiography is not useful for follow-up examination after the placement of Wallstents and three other types of nitinol stent in the bile duct.

Index words : Bile ducts, obstruction
Bile ducts, stents and prostheses
Magnetic resonance (MR), cholangiopancreatography

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