

### The Usefulness of Magnetic Resonance Cholangiography in the Diagnosis of Biliary Atresia

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**Purpose :** To evaluate the usefulness of magnetic resonance cholangiography(MRC) for the diagnosis of biliary atresia in infantile cholestatic jaundice.

**Methods :** Fifty consecutive infants with cholestatic jaundice underwent single-shot MRC for 3 years. The radiologic diagnosis of non-biliary atresia with MRC was based on visualization of the common bile duct and common hepatic duct. The diagnosis of biliary atresia was based on non-visualization of either the common bile duct or common hepatic duct. The final diagnosis of biliary atresia or non-biliary atresia was made with operations or clinical follow-up until jaundice resolved.

**Results :** MRC could clearly visualize the gallbladder, cystic duct, common hepatic duct, common bile duct, both intrahepatic ducts and second order intrahepatic ducts in small neonates and infants. MRC had accuracy of 98%, sensitivity of 100% and specificity of 96% for diagnosis of biliary atresia as the cause of infantile cholestatic jaundice.

**Conclusions :** MRC is a very reliable noninvasive imaging study for diagnosis of biliary atresia in infants with cholestatic jaundice. (J Korean Pediatr Soc 2001;44:899-907)

**Key Words :** Biliary atresia, Infantile cholestatic jaundice, Magnetic resonance imaging, Cholangiography

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2

(Kasai portoenterostomy)

가

가 (cholestatic jaundice)

(acholic stool)

(biliary atresia)

(neonatal he-

patitis)

(operative cholangiography)

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1, 2)

(magnetic reso-

nance cholangiography)

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(choledochal cyst)

(anomalous pancreatobiliary duct union)

2

가

<sup>3, 4)</sup>

(periportal thickening)가

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가  
tic bile duct)가

(extrahepa-

2 , 가

1 , 가

0 가

<sup>5)</sup>

2 ,

1

0

가 가

가



1.

3.

1998 1 2000 12 3

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(operative cholangiography)

<sup>99mTc</sup> DISIDA (diisopropyliminodiacetic acid)

(liver biopsy)

2.

4.

BA (biliary

atresia group, BA group)

4

NBA (non-biliary atresia

1 chloral hydrate(Pocral; Hanlym,

group, NBA group)

Seoul, Korea; 50 mg/kg)

Student t test

Mann-Whitney test

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<sup>5)</sup>

. P 0.05

가

(non-biliary atresia)

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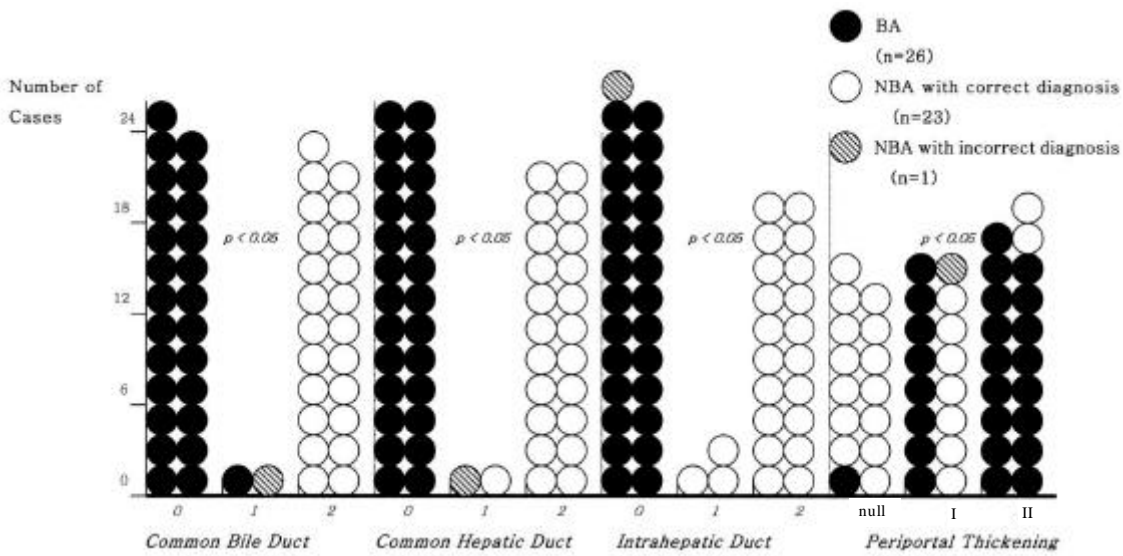
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<sup>99mTc</sup> DISIDA

50 가  
 50  
 99mTc DISIDA  
 BA 26 NBA 7 (26%),  
 (BA : 15, NBA : 19 (74%) NBA 24  
 33 30 13 (54%), 11 (46%) . BA  
 18). 26 4  
 2 , 1 62.8 (15-210 ) NBA  
 (parenteral nutrition 71.5 (21-  
 associated cholestasis) 1 150 ) .  
 (common hepatic duct perforation) (Table 1).  
 20 BA 26  
 가 I 1



**Fig. 1.** Score of magnetic resonance(MR) cholangiographic findings in infantile cholestatic jaundice(n=50). BA; biliary atresia in final diagnosis, NBA; non-biliary atresia in final diagnosis, 0; no visualization, 1; uncertain visualization, 2 :definite visualization, null; no periportal thickening, I; periportal thickening <diameter of portal vein, II; periportal thickening >diameter of portal vein.

**Table 1.** Demographic Characteristics and Final Diagnosis in Infantile Cholestatic Jaundice(n=50)

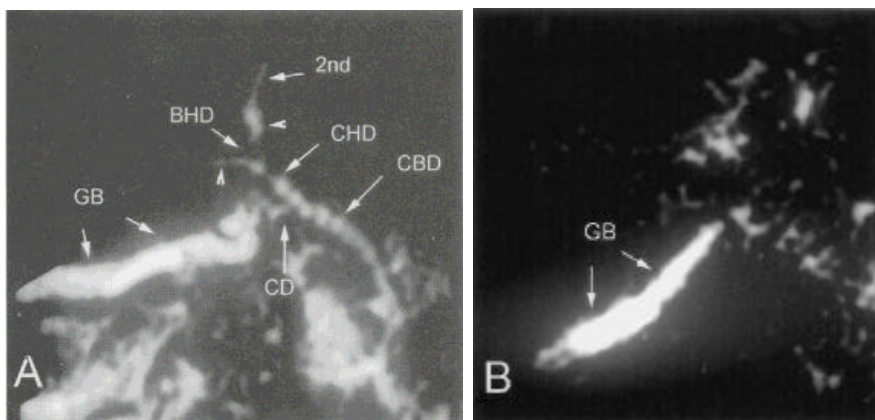
	Biliary atresia group(n=26)	Non-biliary atresia group(n=24)
Gender(%)		
Male	7(26%)	13(54%)
Femal	19(74%)	11(46%)
Age at MR cholangiography(day)	62.8(15- 210)	71.5(21- 150)
Final diagnosis	Type of biliary atresia	Neonatal hepatitis 20(84%)
	Type I 1(4%)	TPN associated cholestasis 2( 8%)
	Type II 1(4%)	Sclerosing cholangitis 1( 4%)
	Type III 24(92%)	Spontaneous CHD perforation 1( 4%)

TPN :total parenteral nutrition, CHD :common hepatic duct.

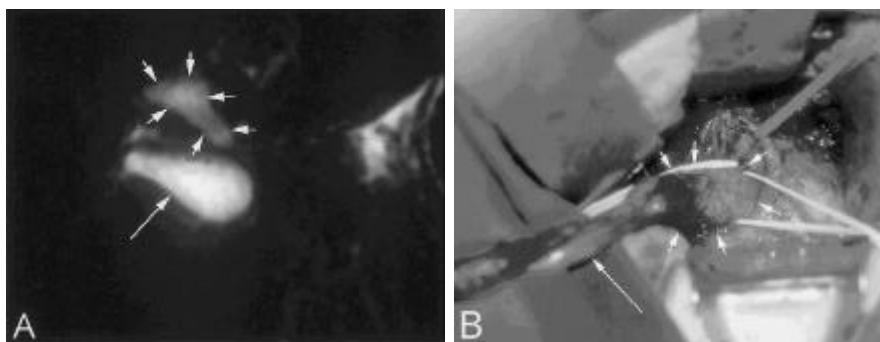
(4%), II 1 (4%) 24 (92%)  
 %) III . NBA 24  
 20 (84%),  
 2 (8%),  
 (sclerosing cholangitis) 1 (4%),  
 1 (4%)가 .  
 2.  
 NBA 24 23 (96%) (gallbladder),  
 (cystic duct), (common bile duct),  
 (common hepatic duct) 가 1

(Fig 1, 2A).  
 (intrahepatic bile duct) 2  
 7 (29%)가 (Fig. 2A).  
 BA 26  
 (Fig. 1, 2B). BA  
 (extrahepatic biliary cyst) 3 (12%)

(Fig. 3). I



**Fig. 2.** (A) MR cholangiography obtained in a 69-day-old female infant with neonatal hepatitis demonstrates gallbladder(GB), cystic duct(CD), common bile duct(CBD), common hepatic duct (CHD), bifurcation of intrahepatic ducts(BHD), right and left intrahepatic ducts(arrowheads) and second branch of left intrahepatic duct(2nd). (B) MR cholangiography obtained in a 64-day-old male infant with biliary atresia does not demonstrate any extrahepatic bile ducts except gallbladder(GB).



**Fig. 3.** MR cholangiography clearly demonstrates the extrahepatic biliary cyst at portal area in 57 day-old female infant of biliary atresia. (A) Oblique coronal T2-weighted single-shot fast MR cholangiography demonstrates an inverted triangular area of high signal intensity(short arrows) and gallbladder(long arrow). (B) The intraoperative photography shows extrahepatic biliary cyst(short arrows) and gallbladder(long arrow).

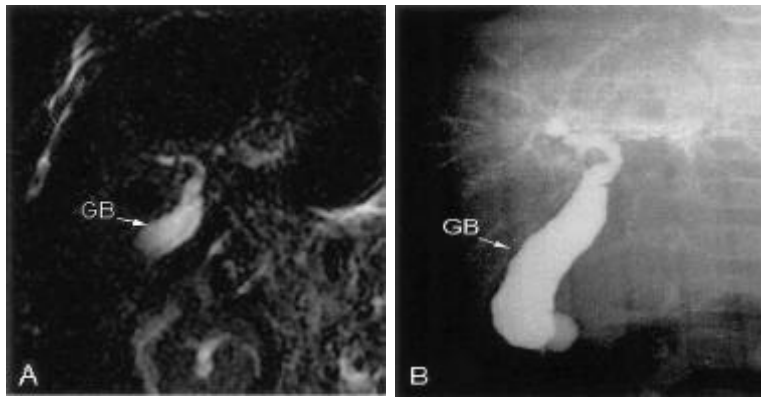


Fig. 4. In the type I of biliary atresia, MR cholangiography (A) fails to depict the extremely hypoplastic intrahepatic ducts which are visible at operative cholangiography (B). GB; gallbladder.

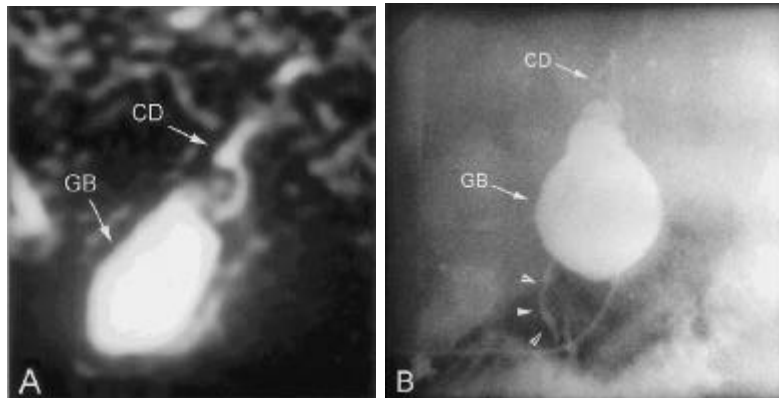
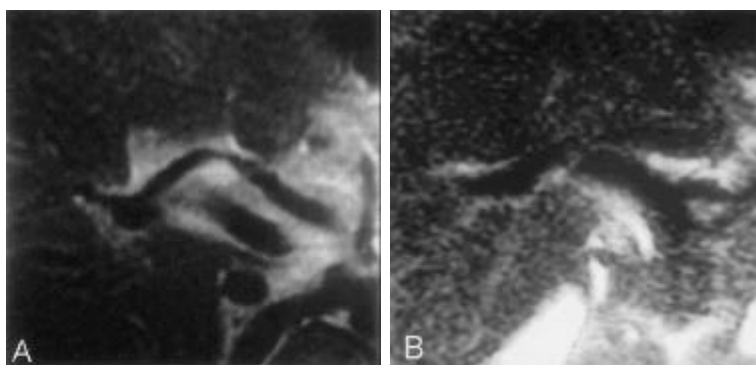


Fig. 5. In the type II of biliary atresia, MR cholangiography (A) fails to demonstrate the hypoplastic common bile duct (arrowheads) which is visible at operative cholangiography (B). GB; gallbladder, CD; cystic duct.

가 positive predictive value 96%, negative  
 가 predictive value 100% (Table 2).  
 (Fig. 4), 2 가 1  
 가 가

(Fig. 5).  
 T2 가  
 (signal) BA 가  
 25 (96%) NBA 가 .  
 10 (42%) 가 가  
 가 (Fig. 1, 6). 가 가 가  
 가 가  
 (accuracy) 98%,  
 (sensitivity) 100%, (specificity) 96%,



**Fig. 6.** (A) MR cholangiography shows grade II periportal thickening in 57 day-old female infant of biliary atresia. (B) MR cholangiography shows grade I periportal thickening in 63 day-old female infant of neonatal hepatitis.

**Table 2.** Validity and Reliability of Magnetic Resonance(MR) Cholangiography for Diagnosis of Biliary Atresia

Fn Dx	MRC Dx		
	BA	NBA	Total
BA (26)	26	0	26
NBA (24)	1	23	24
Total	27	23	50

Accuracy; 98%, sensitivity; 100%, specificity; 96%, positive predictive value; 96%, and negative predictive value; 100% for diagnosis of biliary atresia. Abbreviations :BA, biliary atresia; NBA, non-biliary atresia; MRC Dx, MR cholangiographic diagnosis; Fn Dx, final diagnosis

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가

(triangular cord sign)

gular cord sign)

8)

가 84%

25 4

가

99mTc DISIDA

가

가

4, 5, 18-20)

가

가

100% 가

가

가

가

가?"

9)

10),

가

가

11)

(ERCP)<sup>12-14)</sup>

(PTC)

15, 16)

가

가

가

17),

가

가

가

가 cholangitis)

4, 6, 19-21) Guibaud 19)

가 가

1

가  
Jaw 21) 16

가

( 6 , 1 )

Fig. 4 Fig. 5

% 가 100

가

가

가  
가

가

21)

가

50

98%, 100%,

96%

가 NBA 23  
(Fig. 1A)

가

1

가

fibrosis)

(periportal

가

1 가

22, 23)

가

가

NBA

BA

가

가

. BA

가

19, 21)

(Fig. 1B).

NBA

1 2

가 23 10

가

가

가

(Fig. 4,

가

가

5).  
19)

21) Guibaud  
(sclerosing

가  
가

NBA

가  
가

3

가

가

가

가

99mTc DISIDA

가

2

가

99mTc DISIDA

98%,

100%,

96%

가

가

가

가

가

가

ERCp

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