

:
 :
 20
 37 가 1 가 19
 T1 -
 T1 -
 [repetition time/echo time/excitation(200/10/1), 3 - mm - thick sections, 256×128 or 256
 matrix, 14×14 - cm field of view, spin - echo pulse sequence]
 30 (18) 60 (2) 6
 Region of Interest (ROI)
 T1 -
 T1 - 3
 가
 가 4 , 가 3 , 가 2 ,
 가 1 (con -
 spicuity)
 :
 91.5 30 60 58.5 가
 426 - 442 가
 180 가 230 - 250
 60 가
 , T1 -
 (Paired t - test, $p=0.0048$).
 , T1 - (Paired t - test, $p=0.0035$).
 :

1 cm

가 (2, 6-8).
 (1, 5).

가

. Dwyer (9)

12

2000 6 19

2001 2 19

8 ,

256 × 192 matrix, 14 × 14 - cm field of view, spin - echo pulse sequence]

가 T1 - 18 G
Gadolinium - DTPA Gadodiamide 0.1 mmol/kg
[repetition time/echo time/excitation(200/10/1), 3 - mm - thick sections, 0.0 gap, 256 × 128 or 256 matrix, 14 × 14 - cm field of view, spin - echo pulse sequence]
3.0 - mm 30 (18)
60 (2) 2 (12) 3 (8) 6

(5, 10 - 12).

, Region of Interest (ROI)

(P)
(A) (contrast to noise ratio, $CNR = P(ROI) - A(ROI)/noise\ SD$, noise SD=standard deviation of the intensity of background noise)가 가

(background noise standard deviation)가

90

2
(1 - 4).

가
(sequential imaging time)

가 (Optimal scan timing)

20
Hyperprolactinemia가 13 , acromegaly가 4 ,
Cushing 1 , 2 4

16
가 bromocriptine gold marker

52 37 가 1 가 19

T1 - [repetition time/echo time/excitation(500/12/3), 3 - mm - thick sections, 0.0 gap,

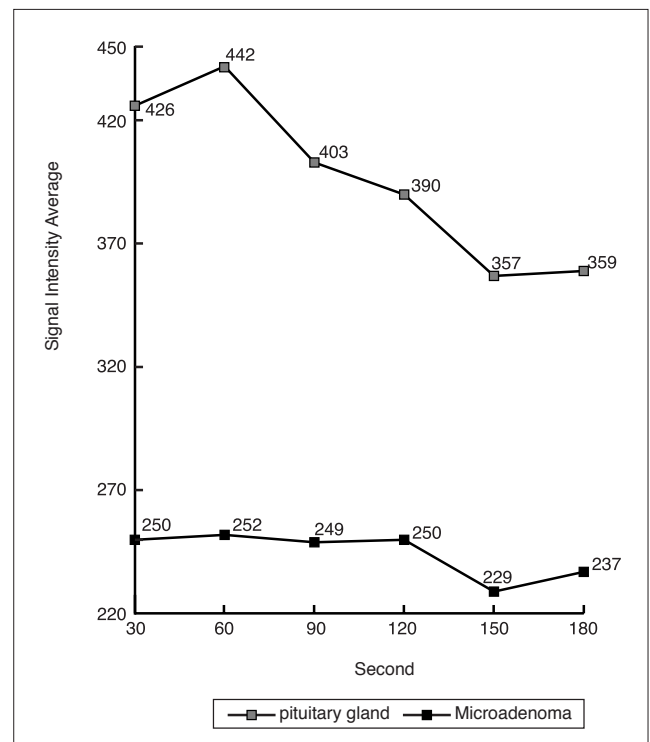


Fig. 1. Time-signal intensity curve of the pituitary gland and the pituitary microadenoma after administration of gadolinium-DTPA. Maximal signal intensity of the pituitary gland is achieved on the 60 seconds , and then the signal intensity of the pituitary gland is gradually decreased in time. Note no significant peak contrast enhancement of the pituitary microadenoma.

ROI
 , T1 -
 180
 (con - (Fig. 1).
 spicuity)
 . 3 가 30 176.2, 60 190.5, 90 153.7, 120
 139.7, 150 127.6, 180 122
 가 4 , 가 3 , 60
 가 2 , 가 가 가
 1 . 3 2 가 가 20 30 6 ,
 60 9 , 90 1 , 120 2 , 150 1 ,
 Paired t - test 180 1 (Table, Fig. 2).
 , p 0.01 T1 - T1 - T1 -
 ROI 3 mm² 54, 134 (Table,
 Fig. 3). T1 - 가 1 T1 -
 가 T1 - 가
 3 T1 - T1 -
 58.5 (paired t - test, $p=0.0008$),
 91.5 T1 -
 60 (paired t - test, $p=0.0048$)

Table. MR Contrast between Pituitary Gland and Microadenoma in Twenty Cases

Case	Age (y)	Sex	Hormone	Treatment	Contrast between pituitary gland and microadenoma											Enhanced peak time (sec)		
					Conventional study		Dynamic study										Pituitary	Adenoma
					PE	CE	30	60	90	120	150	180	240	300	360(sec)			
1	45	F	Prolactin	Bromocriptine	56	21	223	158	199	123	49	25				60	90	
2	52	F	GH	Radiation	27	110	35	83	102	128	152	101				90	60	
3	22	F	Prolactin	Bromocriptine	66	108	179	69	83	85	52	110				30	60	
4	25	F	Prolactin	Bromocriptine	7	73		202		126		204	167	101	245	180	120	
5	44	F	GH	Radiation	15	124	164	176	136	71	62	143				30	120	
6	31	F	Prolactin	Bromocriptin	66	323	441	458	432	351	250	314				30	150	
7	31	F	Prolactin	Bromocriptine	59	210	211	258	263	204	222	259				90	120	
8	19	F	Prolactin	Bromocriptine	41	74	175	146	172	197	117	80				30	30	
9	34	F	Prolactin	Bromocriptine			51	176	36	174	40	47				60	30	
10	23	F	?	? 31	124	55	195	118	91	108	20			60		90		
11	56	F	GH	Operation	145	338	265	254	230	218	219	200				30	120	
12	32	F	Prolactin	Bromocriptine	81	156	259	258	195	205	185	214				30	30	
13	25	F	Prolactin	Bromocriptine	62	25	104	128	27	47	55	72				60	90	
14	51	M	GH	Operation	43	75	150	178	155	106	89	80				60	120	
15	35	F	ACTH	Operation	18	48		93		94		69	50	5	36	60	300	
16	44	F	Prolactin	Bromocriptine	89	60	70	100	10	46	54	41				60	90	
17	40	F	Prolactin	Bromocriptine	94	367	304	390	344	265	276	204				60	120	
18	40	F	Prolactin	Bromocriptine	54	157	330	316	170	149	218	115				60	90	
19	35	F	Prolactin	Operation	18	86	85	82	45	53						30	30	
20	31	F	Hypopituitarism	Hormone	51	74	72	90	51	62	22	22				60	30	
Ave	37				53.8	134.4	176.2	190.5	153.7	139.7	127.6	122.0				58.5(sec)	91.5(sec)	

PE : non-enhanced T1-weighted image

CE : contrast enhanced T1-weighted image

(Fig. 4).

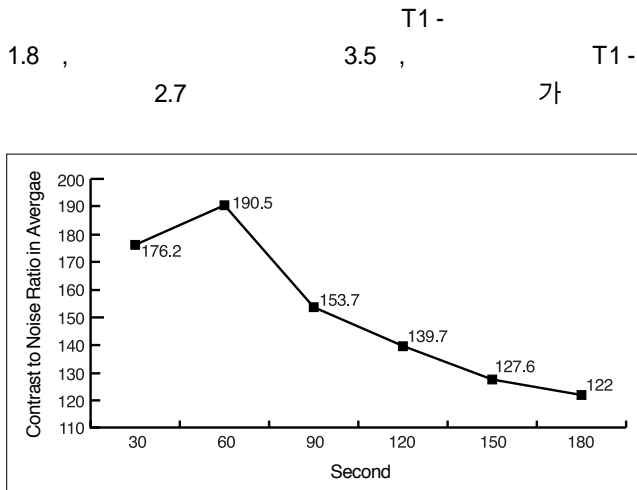


Fig. 2. Time-contrast curve of the pituitary microadenoma shows maximum contrast in the second image (60 seconds) and gradual decrease of the contrast throughout the remaining period of time.

T1 -
가 20 6 (30%)
T1 -
(Fig. 5)가 가 13 (65%)
T1 - 가
1 (5%)
T1 - 20 5 ,
T1 - 1 ,
T1 - T1 -
(paired t - test, $p=0.0004$),
T1 -
(paired t - test, $p=0.0035$).

60

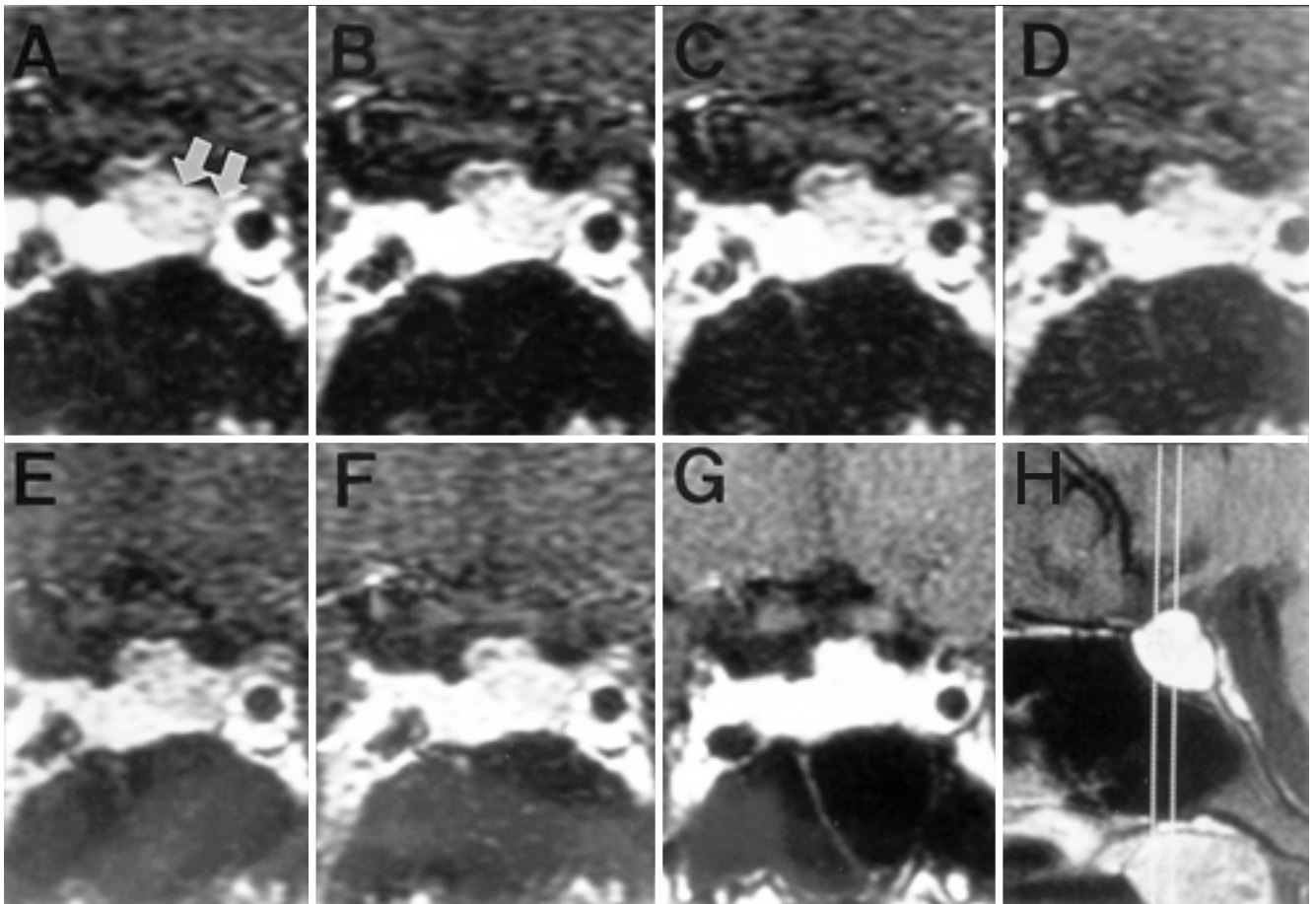


Fig. 3. Dynamic coronal T1-weighted images which is scanned at 30 seconds (A), 60 seconds (B), 90 seconds (C), 120 seconds (D), 150 seconds (E), and 180 seconds (F) in the same plane and conventional contrast enhanced T1-weighted coronal image (G) which is scanned after dynamic imaging shows excellent image contrast of the pituitary microadenoma (double arrow) to the normal pituitary gland on first three images (A, B, C) and gradual decrease of the contrast on following images (D, E, F). Conventional contrast enhanced T1-weighted sagittal image (H) shows the pituitary microadenoma and dotted lines denote the sectional plane of coronal scan.

(21).
T1 -
가 1
(sequential)
가 (21).
, temporal resolution 30
conventional spin - echo sequence 가
fast spin - echo sequence temporal res -
olution

(Rathke ' cleft cyst)

가
ROI (3 mm²)

가

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Value of Dynamic MR Imaging in the Detection of Pituitary Microadenoma¹

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Purpose: To determine whether dynamic or conventional MR imaging is most useful for the detection of pituitary microadenoma.

Materials and Methods: The study involved 20 patients (M:F = 1:19, mean age = 37 years) in whom a pituitary microadenoma had been identified. Routine unenhanced coronal T1-weighted MR imaging was followed by dynamic imaging (repetition time/echo time/excitation = 200/10/1, 3-mm-thick sections, 256 × 128 or 256 matrix, 14 × 14-cm field of view, scan time = 30 or 60 seconds, spin-echo pulse sequence), and contrast-enhanced coronal T1-weighted imaging was then immediately performed. Temporal changes in signal intensity were quantified with manually placed ROIs (regions of interest, circular, 3 mm²), and tissue contrast between the pituitary gland and microadenoma was calculated. Conspicuity of the tumor margin was graded by three radiologists working independently as either 4 (excellent clear margin), 3 (good clear margin), 2 (relatively clear margin), or 1 (unclear margin).

Results: Average peak enhancement of the pituitary gland and microadenoma occurred at 58.5 and 91.5 seconds, respectively. Maximum enhancement of the pituitary gland occurred within 30 to 60 seconds of contrast infusion (signal intensity range: 426 - 442), but during dynamic MR imaging, the microadenoma showed relatively constant enhancement (signal intensity range: 230 - 250). Maximal contrast between normal pituitary gland and the microadenoma was seen at 60 seconds or in the first three sequential images. Dynamic MR images were superior to conventional T1-weighted images, with or without contrast infusion, not only in terms of tissue contrast between the pituitary gland and the microadenoma ($p = 0.0048$), but also as regards tumor margin conspicuity ($p = 0.0035$).

Conclusion: Dynamic MR imaging is a useful technique in the detection of pituitary microadenoma.

Index words : Pituitary gland, neoplasms
Pituitary gland, MR

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