

말초신경질환에서 자기공명영상의 진단적 가치

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= Abstract =

The Value of MRI in Diagnosis of Peripheral Nerve Disorders

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Objective : The development of magnetic resonance neurography(MRN) has made it possible to produce high - resolution images of peripheral nerves themselves, as well as associated intraneural and extraneural lesions. We evaluated the clinical application and utility of high - resolution MRN techniques for the diagnosis and treatment of a variety of peripheral nerve disorder(PND)s.

Material and Method : MRN images were obtained using T1 - weighted spin echo, T2 - weighted fast spin echo with fat suppression, and short tau inversion recovery(STIR) fast spin - echo pulse sequences. Fifteen patients were studied, three with brachial plexus tumors, five with chronic entrapment syndromes, and seven with traumatic peripheral lesions. Ten patients underwent surgery.

Results : In MRN with STIR sequences of axial and coronal imagings, signals of the peripheral nerves with various lesions were detected as fairly bright signals and were discerned from signals of the uninvolved nerves. Increased signal with proximal swelling and distal flattening of the median nerve were seen in all patients of carpal tunnel syndrome. Among the eight patients with brachial plexus injury or tumors, T2 - weighted MRN showed increased signal intensity in involved roots in five, enhanced mass lesions in three, and traumatic pseudomeningocele in three. Other associated MRI findings were adjacent bony signal change, neuroma, root adhesion and denervated muscle atrophy with signal change.

Conclusion : MRN with high - resolution imaging can be useful in the preoperative evaluation and surgical planning in patients with peripheral nerve lesions.

KEY WORDS : Magnetic resonance neurography(MRN) · Peripheral nerve disorder · Short tau inversion recovery (STIR) · Brachial plexus Peripheral nerve injury.

서론

말초신경질환(peripheral nerve disorder)은 신경근육계 질환 중 가장 흔한 질환군으로, 그 발생 빈도는 인구 10만 명당 10명 이상에 달한다¹⁾. 최근에는 자기공명영상(magnetic resonance neurography)가 말초신경질환의 진단에 유용한 방법으로 알려져 있다²⁾. 특히, 자기공명영상은 말초신경의 구조와 기능을 평가할 수 있는 비침습적인 방법이며, 최근에는 고해상도 자기공명영상(high resolution magnetic resonance neurography)이 말초신경의 미세 구조를 평가할 수 있는 방법으로 개발되었다³⁾. 본 연구는 고해상도 자기공명영상(high resolution magnetic resonance neurography)을 이용하여 말초신경질환의 진단적 가치를 평가하고자 하였다.

Table 1. Clinical features of 15 patients with peripheral nerve diseases

No.	Age/sex	Presentation	Diagnosis
1	53/F	Finger tingling for 6 months	CTS, Lt
2	49/F	Hand tingling & weakness for 3 months	CTS, Lt
3	48/F	Finger tingling for 4 months	CTS, Lt
4	56/M	Hypothenar atrophy & tingling for 9 months	Cubital tunnel syndrome, Lt
5	62/F	Hand weakness & pain for 6 months	Posttraumatic neuroma, Rt ulnar nerve
6	39/M	Elbow pain for 2 years	Radial tunnel syndrome, Rt
7	64/F	Rt footdrop after lumbar laminectomy	Peroneal nerve injury, Rt
8	26/M	Arm atrophy & pain for 10 months	BPI, Lt
9	2/F	UE flaccid monoplegia for 5 months	BPI, Rt
10	56/M	UE pain & weakness for 10 months	BPI, Lt
11	4/M	UE flaccid monoplegia for 6 months	BPI, Lt
12	44/M	Rt arm weakness & pain for 10 months	BPI, Rt
13	55/F	Rt supraclavicular mass for 2 years	Neurilemmoma, Rt C6 root
14	12/M	Lateral neck mass	Desmoid tumor, Lt
15	47/F	Upper anterior chest pain	Cystic tumor, Lt T2 roots

CTS : carpal tunnel syndrome, Lt : left, Rt : right, BPI : brachial plexus injury, UE : upper extremity

MRN

9)가

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가

대상 및 방법

1997 10 1998 2 5

15

3

5

3

가

1

2 64

가 7

가 8 (Table 1).

가

10

4

1

3

1.5Tesla(Magnetom Vision, Siemens, Germany) spin echo T1 (TR, 600msec ; TE, 12msec) T2 (TR, 4500 msec ; TE, 100msec) (STIR ; short tau inversion recovery ; 6800/60/180 °)

3~5mm, (FOV ; field of

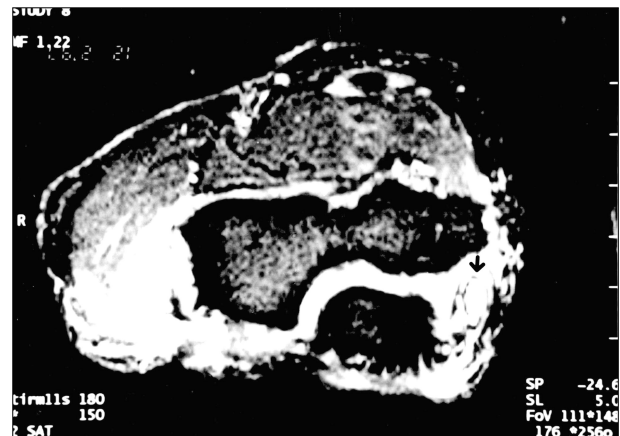


Fig. 1. Case 4(cubital tunnel syndrome). Axial STIR (short tau inversion recovery) image showing high signal intensity of the ulnar nerve at the left elbow (arrow).

view) 13×16cm, (matrix) 256×198

결 과

MR

(STIR MRN)

. 1

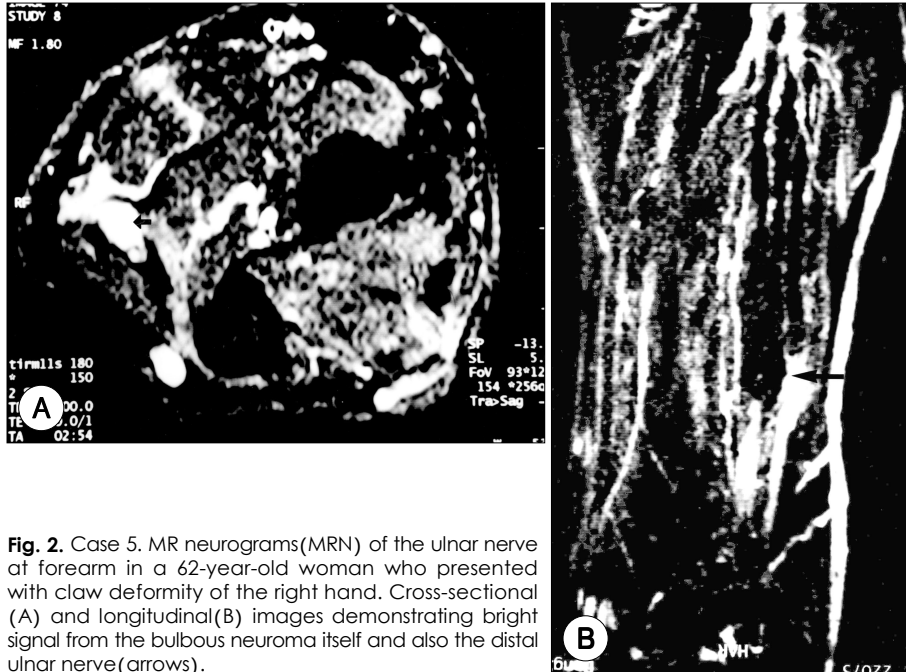


Fig. 2. Case 5. MR neurograms(MRN) of the ulnar nerve at forearm in a 62-year-old woman who presented with claw deformity of the right hand. Cross-sectional (A) and longitudinal(B) images demonstrating bright signal from the bulbous neuroma itself and also the distal ulnar nerve(arrow).

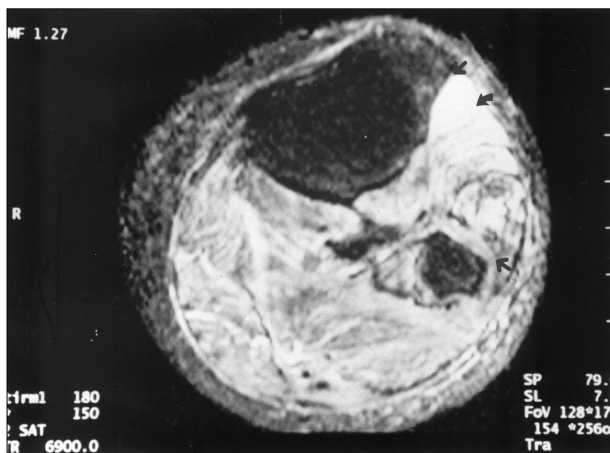


Fig. 3. Case 7(trumatic peroneal nerve injury). STIR image of the right lower leg 4 weeks after the onset of symptoms shows slightly increased signal in peroneal supplied muscles(between arrows) and more intense signal in tibialis anterior muscle(curved arrow).

(Fig. 5), 1

, 1

4

(Table 2).

고 찰

가

MRI

(motion artifact)

(MRN)

(phased - array surface coil)
(fast spin - echo pulse sequences)

⁴⁾⁸⁾²²⁾ T1

(Fig. 1),

(Fig. 2),

(Fig. 3)

3

gadolinium

(STIR)

(fat suppression)

(Fig. 4) 3 2

가

¹⁸⁾
(high signal intensity)가

(CNR ; contrast - to - noise ratio)가

5 3

Table 2. MRI findings of 15 patients with peripheral nerve diseases

No	STIR*	Associated findings	Treatment
1	H	Proximal swelling, distal flattening	CTR
2	H	Radius fracture, enhancement of tendons	CTR
3	H	Proximal swelling, distal flattening	CTR
4	H	Bony erosion with spur at medial epicondyle	Subcutaneous transposition
5	H	Bulbous neuroma	Sural nerve graft
6	I	High signal at lateral epicondyle	Release of PIN
7	H	Diffuse muscle atrophy	Laminectomy
8	I	Pseudomeningocele of C6 root	Conservative
9	I	Root adhesion	External neurolysis
10	I	Diffuse muscle atrophy & pseudomenignocoele	Conservative
11	H	Traumatic neuroma	Conservative
12	I	Pseudomeningocele of C5 root	Refuse operation
13	H	Enhanced mass	Total resection
14	H	Huge infiltrative mass	Biopsy
15	I	Extraforaminal cystic mass at left T1,2 root	Conservative

* : Signal intensity of lesioned nerve in STIR(short tau inversion recovery) image

CTR : carpal tunnel release, PIN : posterior interosseous nerve, H : high signal intensity, I : isosignal intensity

가 가 6 T1
T2
가
MRN
1)9) ,
MRI
17)21)
(avulsion injury)
(traumatic pseudomeningocele),
(flexor retinaculum)
10)14) , Horch 6)
MRN
(bowing)
가
94%
가 67%
MRI가
myelography)
sleeve
6)10)14) 12)
가
Kuntz
8)
MRN
landmark)가
(bony

가
가

(axial oblique view)
(sagittal)
T1

T2

7)13)15)

5

1

3

1

가

12)15)

MRI

5)13)15)17)

T2

가

20)

3

MRI

가

7)15)

(supraclavicular region)

rolateral neck area)

MRI

MRN

MRI

가

가

22)

cervical paraspinal muscles)

20)

MRI

가

결론

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- : 2000 11 13
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