

1. (periodic limb movement disorder, PLMD) (restless legs syndrome, RLS) (underlying disease)

2. 1) nocturnal myoclonus leg jerk 20~40 (4~90) 0.5~5 (tibialis anterior) periodic leg movements in sleep , periodic limb movements in sleep(PLMS) periodic movements in sleep(PMS) , periodic limb movements (PLMs) , periodic limb movement disorder(PLMD)

가 (nonrestorative sleep) (excessive daytime sleepiness) 1945 Ekbom (disagreeable)

* Address for correspondence
Choong-Kun Ha, M.D.
 Department of Neurology,
 College of Medicine, Inha University
 Shinheung-dong 3ga 7-206, Joong-gu,
 Incheon, 400-103, Korea
 Tel : +82-32-890-3860 Fax : +82-32-890-3864
 E-mail : ckha@inha.ac.kr

(narcolepsy),¹³
¹⁴ REM ¹⁵

²² 8
²⁷
 5.2%
 28
 가
 SPECT
 homovanillic acid
 D2
 D2 가
¹⁸F-Dopa
¹¹C-raclopride
 D2
 PET
 43
 (descending inhibitory activity)
 가
^{2,33}
^{30,31,32}
²⁹
 가
 opioid
 opiate
 naloxone
 opiate 가
 가
 opioid
 33
 NREM
 50%
³⁴
 4)
 가
³⁵
 (3)
 MR
 MR
 가
 veraging technique)
¹²
 (backa-
 가
 (dopa-responsive dystonia)
⁴⁵
 GTP-
 cyclohydrolase
 tetrahydrobiopterin
 Tetrahydrobiopterin tryptophan tyrosine
 hydroxylase
 biopterin
 biopterin
 tyrosine hydroxylase
 3)
 가
 가
 levodopa opioid가
 가 neuroleptic-induced akathisia
 가
 ferritin
 ferritin
⁵¹

transferrin
 ferritin 65% transferrin 3 가 MR 49
 가 가
 MR 49 가

BBB transferrin 가 5.
 1)
 ferritin (1990)³
 1)
 Ferritin light subunit
 , heavy subunit , 2)
 52 , 3)
 oligodendrocyte , 20~40 0.5~5
 transferrin mRNA , 4)
 80~95%가 oligodendrocyte , ferritin
 heavy subunit가 가 가 , 5)
 , ferritin 가
 oligodendrocyte가 가 The International
 Restless Legs Syndrome Study Group(1995)⁸
 (Table 1).
 53 가 1) , 2)
 가 52 , 3)
 ferritin heavy subunit, ferritin , 4)
 transferrin mRNA
 가 가 45
 가 가

Table 1. Diagnostic criteria for restless legs syndrome by The International RLS Study Group

Essential Features	Nonessential but Common Features
1. Desire to move the limbs usually associated with paresthesias or dysesthesias 2. Motor restlessness 3. Symptoms are worse or exclusively present at rest with at least partial and temporary relief by activity 4. Symptoms must be worse in the evening or during the night	1. Sleep disturbance and consequences 2. PLMS 3. Involuntary limp movements while awake and at rest (similar to PLMS and disappearing when patient gets up to walk) 4. Neurological examination: no abnormalities in the primary from, but in the secondary form, but in the secondary form signsof a peripheral neuropathy or radiculopathy may be present 5. Clinical course: may beginat any age but most severely affected patients are middle to older age; is usually progressive but a static course or remission may occur 6. Family history: sometimes present and suggestive of an autosomal dominant mode of inheritance

PLMS, periodic leg movements during sleep.

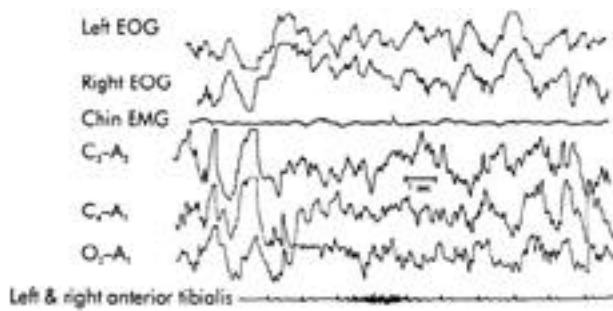


Figure 1. Polysomnogram showing a periodic limb movement that is not accompanied by arousal.

Leg jerk is indicated by electromyogram(EMG) burst in left and right leg(combined) tibialis anterior EMG(bottom channel). Ongoing Stage 3 sleep is not disrupted(no arousal). EOG=electrooculogram; C₃=left high central electroencephalogram(EEG); C₄=right high central EEG; O₂=right occipital EEG; A₂=right ear; A₁=left ear.

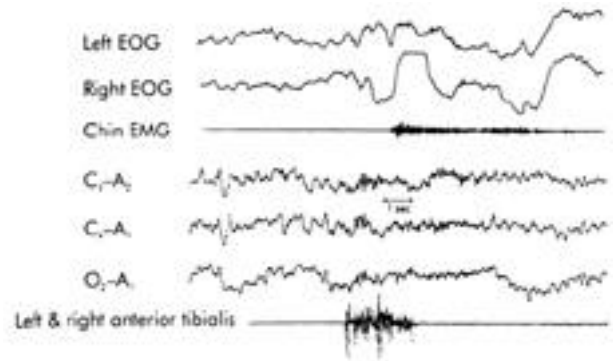
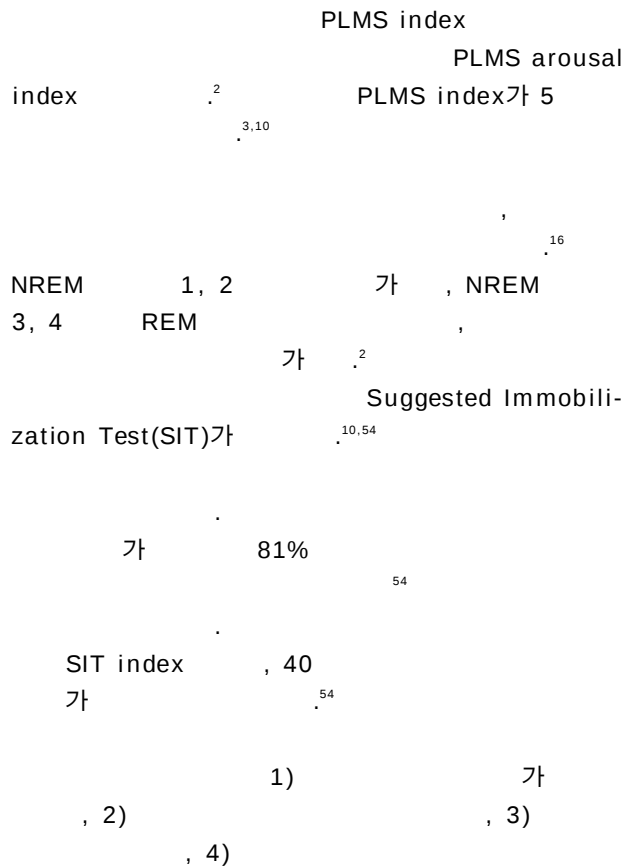


Figure 2. Polysomnogram showing a periodic limb movement that is accompanied by arousal.

Leg jerk in tibialis anterior electromyogram(EMG)(bottom channel) is followed by electroencephalogram(EEG) arousal, with increased chin muscle activity(EMG) and eye movement. EOG=electrooculogram; C₃=left high central EEG; C₄=right high central EEG; O₂=right occipital EEG; A₂=right ear; A₁=left ear



(Fig. 1,2), 4
NREM 1, 2, 3, 4
가, NREM
가, REM
K complex 가
K-alpha complex 10



6. 2,6,10
1) Hypnic myoclonus or sleep starts ;

2) Fragmentary myoclonus ; (150 msec)

REM phasic REM twitch . NREM

3) Myoclonic epilepsy ;

4) Spinal myoclonus ;

5) "Painful legs and moving toes " syndrome ;

6) Nocturnal leg cramp ;

7) Polyneuropathy ;
(paresthesia)

8) Lumbosacral radiculopathy ;

9) Peripheral vascular insufficiency ;
(claudication)

10) Neuroleptic-induced akathisia ;
(motor restlessness)

7.

1)

(1)

80%

•

,

,

가

8.

56

가

3

57

PLMS arousal index 25

가

2

가

가 가

2

가

56

가

58

ferritin

51,58

3

2.

가 가

2

가

20

16

(1) L-dopa

15 ~ 40%

2,10,56

2,6,,55,60,61

59

가

carbidopa

L-dopa

가

2,10,60-63

L-dopa

(sleep

2,10

latency)

60,63

60

가 가

^{61,63} attention deficit hyperactivity disorder
 L-dopa 100~200mg
 , L-dopa
 가 L-dopa
⁶⁴
 , 300-
 400mg
²
 , dopa decarboxylase inhibitor
 augmentation
^{62,63} Rebound L-dopa
 가
⁶⁴ Augmentation
 , 가
 가
⁶³ L-dopa
 , L-dopa
 Augmentation L-dopa
 L-dopa
 L-dopa (dyskinesia)
 (2)
 D2 bromocriptin
 pergolide
^{61,63} Pergolide
 가
 bromocriptin
 (bromocriptin, pergolide 0.75mg
 0.05mg)
 bromocriptin,
 pergolide 1.75~2.5mg, 0.25~0.75mg
 domperidon 30~60mg
^{2,63} 1~2
 Pergolide
 ,

가 ⁶³ L-dopa
 ,
 augmentation rebound
²
 L-dopa
 가
²
 L-dopa
 , 가 prn base
 .
 pramipexole
 (0.36~1.5 mg), ropinirole(0.5~4.0 mg), alpha-
 dihydroergocriptine(10~40 mg)
^{63,65} Pramipexole
 ,
 PLMS index
⁶⁵
 cabergoline
 1.0~4.0 mg
 ,
 가
 L-dopa augmentation
 가
⁶⁶
 2) Benzodiazepine
 clonazepam
 Clonazepam L-dopa
⁶¹
 0.5~2.0 mg
 triazolam
 ,
 nitrazepam,
 lorazepam, temazepam
 PLMS index PLMS arousal
 index
 PLMS index 가
 ,
 3) Opioids
 ,
 PLMS
 index가
^{2,10}
 opioid
 oxycodone(15.9 mg), propoxyphen(200 mg),
 methadone(5~30 mg), levorphanol tartrate

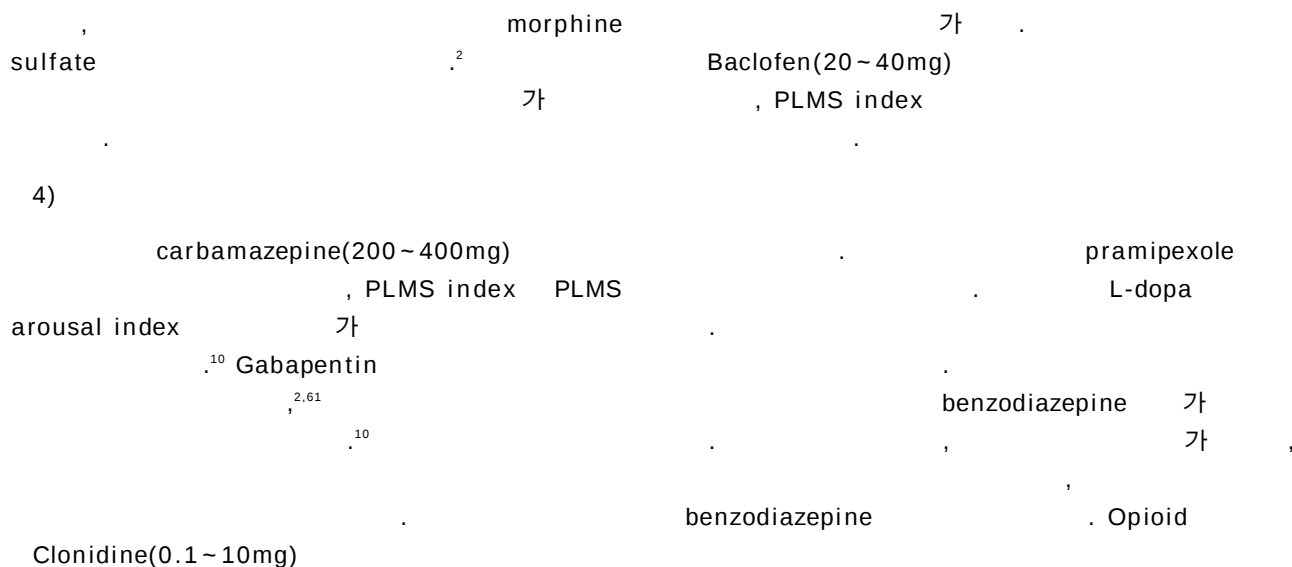


Table 2. Flow chart for management of restless legs syndrome

	Agents	Dosages(mg)	Side Effects	Countermeasures
Step 1	DA Agonists			
	Pramipexole	0.125-1.0 [*]	Nausea and orthostatic hypotension	Slowly increase dosage or use domperidone if available (10-30 mg)
	Pergolide	0.1-0.5 [*]	Insomnia	Use small dose of benzodiazepines in association with DA agonists
			Daytime fatigue and somnolence	Reduce dosage or discontinue DA agonists and use levodopa (if severe and persistent)
Step 2	DA Precursors			
	Levodopa with benserazide or carbidopa	Regular or slow release: 100-25, 200-50 [†]	Hallucinations	Discontinue DA agonists
			Tolerance	Drug holiday for 2 weeks, then return to lower dosage
			Same as for dopaminergic Agonists	See countermeasures for DA agonists above
Step 3	Benzodiazepines			
	Clonazepam	0.5-2.0 [*]	Morning rebound or augmentation of RLS in early evening	Use small extra dose of levodopa during daytime or reduce dosage or combine levodopa with DA agonists or benzodiazepines or discontinue levodopa (if severe and persistent)
	Temazepam	15-30 [*]	Daytime somnolence	Reduce dosage or use 1-2 h before bedtime
	Nitrazepam	5-10 [*]	Tolerance	Drug holiday for 2 weeks, then return to lower dosage
Step 4	Opiates			
	Oxycodone	5 [†]	Constipation	Symptomatic treatment
	Propoxyphene	200 [*]	Dependency	Drug holiday or withdrawal
	Codeine	15-60 [*]		
Step 5	Antiepileptic Drugs			
	Carbamazepine	200-400 [*]	Nephrotoxicity	Monitor blood level regularly and adjust dosage
	Gabapentin	100-400 [*]	Daytime fatigue and somnolence	Reduce dosage

^{*} At bedtime.

[†] At bedtime; repeated once during the night if needed. Slow release preparation not usually repeated.

DA, dopamine; RLS, restless legs syndrome.

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