

폐쇄성 수면무호흡증의 진단

가
예 미 경 · 김 광 훈

Diagnosis of Obstructive Sleep Apnea Syndrome

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10 가 . ,
가 50% .
가 가 .
가 가 .
증 상
5 , 7 30 ,
(+)가 10 가 가
(OSA) velophar - 가
yngeal sphincter tongue base 2 . OSA
가 compliance가 가
(Fig. 1). Velopharyngeal sphincter가
palatopharyngoplasty 90~100% 가 .²⁾³⁾
tongue base epiglottis, aryepiglottic fold가 OSA
palatopharyngoplasty 가
가 (tracheotomy, hy - (Table 1).
oid plasty, or hyoid - mandibular reconstruction)
¹⁾ 가 .

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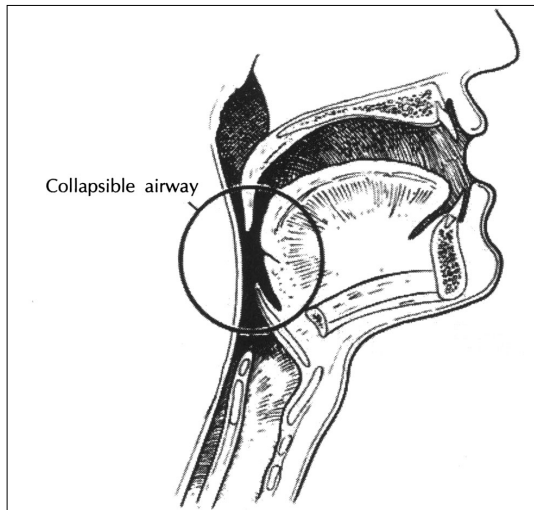


Fig. 1. Cutaway anatomical view to show collapsible portion of airway where no rigid support exists and where snoring originates.

Table 1. Signs and symptoms of obstructive sleep apnea

Loud snoring (notable in all patients)
Hypersomnolence (notable in most patients)
Abnormal motor activity during sleep
Obesity (frequent but not necessarily)
Hyperactivity and antisocial behavior (children)
Personality changes, depression
Impaired intellectual performance
Hypertension (frequent)
Nocturnal cardiac arrhythmias (frequent)
Cor pulmonale (in advanced cases)
Morning headache
Sexual impotence

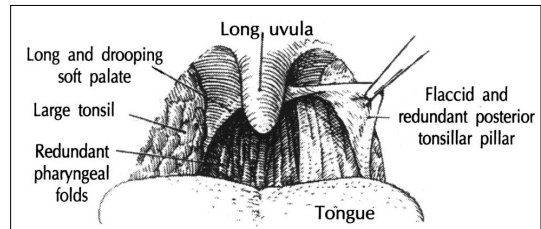


Fig. 2. Intra-oral view demonstrates some common anatomical features of snorers.

mass index (),
(cricothyroid membrane level) shirt - collar

OSA
가 ,
가 가
가 .⁵⁾ OSA
collapsibility 가, compliance 가, re-
sistance 가, cross - sectional area .⁶⁾
genioglossus,
geniohyoid, palatoglossus, palatopharyngeus, styl -
opharyngeus, tensor palatini
OSA

가
가
가
가 (Fig. 2,
Table 2).
가 OSA
가 (Table 3).

이학적 검사

(vital sign), body

Table 2. Anatomical factors contributing to snoring

1. Incompetent tone of palatal, and glossal muscles which fail to maintain airway patency during the inspiratory phase of the respiratory cycle
2. Space-occupying masses (i.e., tonsils, adenoids, cysts, tumors, tongue, etc.) which compromise the size of the pharyngeal airway
3. Excessive length of the soft palate and uvula such that they decrease the anterior-posterior dimension of the nasopharyngeal airway and also vibrate during respiration
4. Obstructive nasal breathing which creates excessive negative pressure in the collapsible pharyngeal airway to achieve inspiratory airflow

Table 3. Pathologic conditions associated with obstructive sleep apnea syndrome^a

Nose	Larynx
Deviated septum	Edema of supraglottic structures
Polyposis	Vocal cord paralysis
Septal hematoma	
Septal dislocation	Neuromuscular
	Cerebral palsy
Nasopharynx	Myotonic dystrophy
Carcinoma	Muscular dystrophy
Adenoidal hypertrophy	Myasthenia gravis
Lymphoma	Multiple sclerosis
Stenosis	Hypothyroidism
Pharyngeal flap	Chiari malformation
Papillomatosis	syringomyelobulbia
	Cerebral palsy
Mouth and oropharynx	Myotonic dystrophy
Hypertrophic tonsils	Shy-Drager syndrome
Lymphoma of tonsils	Acquired nonprogressive
Lingual cyst	dysautonomia
Lingual tonsillar hypertrophy	Olivopontocerebellar
Macroglossia	degeneration
Acromegaly	Spinal cord injury
Micrognathia	Bulbar stroke
Congenital	
Acquired	
Lipoma of neck	
Hunter syndrom	
Hurler syndrome	
Head and neck burns	
Papillomatosis	

a : From ref. 58, with permission

Fiberoptic nasopharyngoscopy with mueller's maneuver(FNMM)

(velopharyngeal valve)

(Fig. 3)⁸⁾

Mueller's maneuver

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1+ : minimal movement(less than 25%) of the components of the circumference of the pharynx -

geal cross section toward the center
 2+ : movement toward the center diminishing cross sectional area of the pharynx by 50%
 3+ : movement toward the center diminishing cross sectional area of the pharynx by 75%
 4+ : inward motion obliterating the airway(100%).

Table 4 Fig. 4 Mueller's maneuver OSA

type type a UPPP

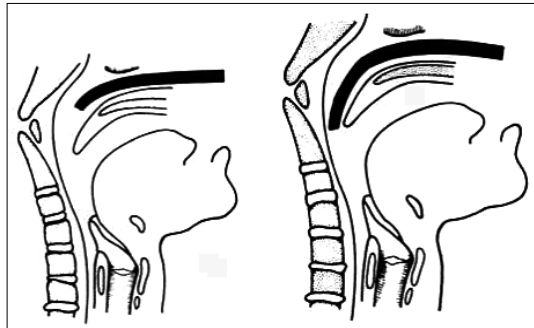


Fig. 3. Mueller's maneuver : Fiberoptic endoscope positioned just above (L) and below (R) oropharyngeal inlet.

Table 4. Upper airway anatomy classification of Mueller's maneuver^a

Site of obstruction		Oropharynx	Hypopharynx
Type	Normal palatal position		
: N (+/-)	Oropharyngeal	3+, 4+	0, 1+
Type	Low palatal position		
: N (+/-)	Predominantly oropharynx	3+, 4+	1+, 2+
	Orohypopharynx involved	3+, 4+	3+, 4+
Type	Normal oropharynx		
	Hypopharyngeal obstruction (retrognathia, micrognathia)	0, 1+	3+, 4+

a : The degree of pharyngeal obstruction at each level is determined by the reduction of pharyngeal lumen and is recorded as follows : 1+, less than 25% (minimal movement) ; 2+, 50% ; 3+, 75% ; 4+, 100% (total airway collapse)

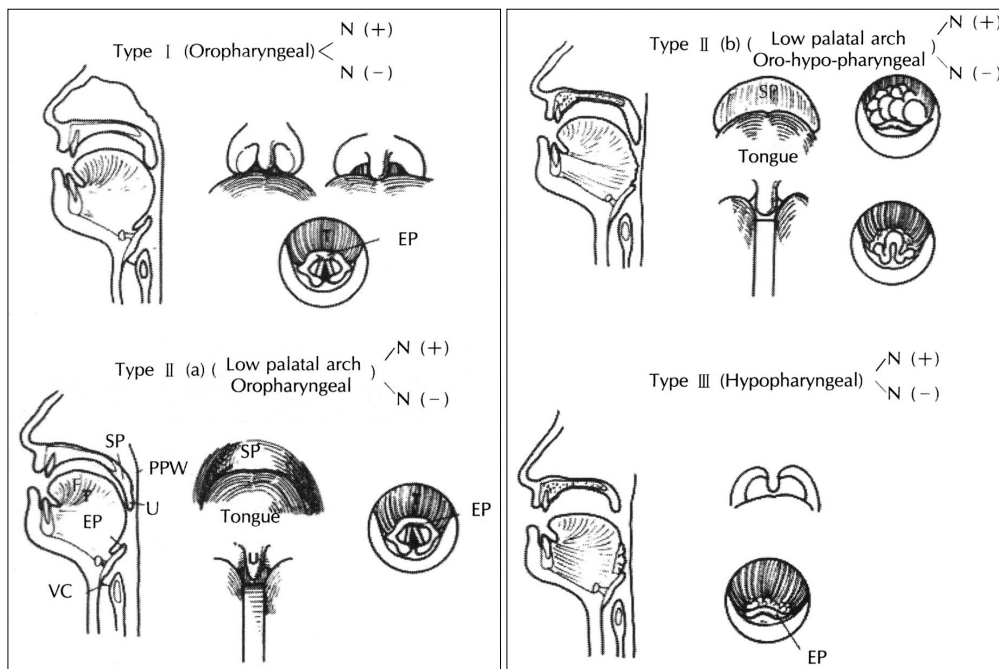


Fig. 4. Illustration of upper airway anatomy classification. A : Type I and type IIa. B : Type IIb and type III. EP, epiglottis ; T, tongue ; SP, soft palate ; PPW, posterior pharyngeal wall ; VC, vocal cord ; U, uvula.

가 가 Polysomnography
 , Electroencephalogram(EEG),
 OSA Electro - oculogram(EOG), electrocardiogram(ECG),
 Electromyogram(EMG),
 , , 가
 특 수 검 사 EEG, EMG, EOG 3가
 , stage 1, 2
 가 stage 3, 4 REM sleep 가 .
 가 가 . Hoffstein ¹⁰⁾
 clinic
 60%, 63% 가 가
 가 가 (Fig. 5).
 Epworth Sle -
 epiness Scale¹¹⁾ Table 5 가 ECG
 8가 0~ OSA
 3 0
 24 16
 OSA
 monitor 가 cycle
 REM
 Oximetry 가
 가 가 가
 가 가 ¹²⁾

Table 5. The Epworth sleepiness scale

Situation	Chance of dozing			
Sitting and reading	0	1	2	3
Watching TV	0	1	2	3
Sitting inactive in a public place (e.g a theater or a meeting)	0	1	2	3
As a passenger in a car for an hour without a break	0	1	2	3
Lying down to rest in the afternoon when circumstances permit	0	1	2	3
Sitting and talking to someone	0	1	2	3
Sitting quietly after a lunch without alcohol	0	1	2	3
In a car, while stopped for a few minutes in traffic	0	1	2	3

0 = no chance of dozing, 1 = slight chance of dozing, 2 = moderate chance of dozing, 3 = high chance of dozing

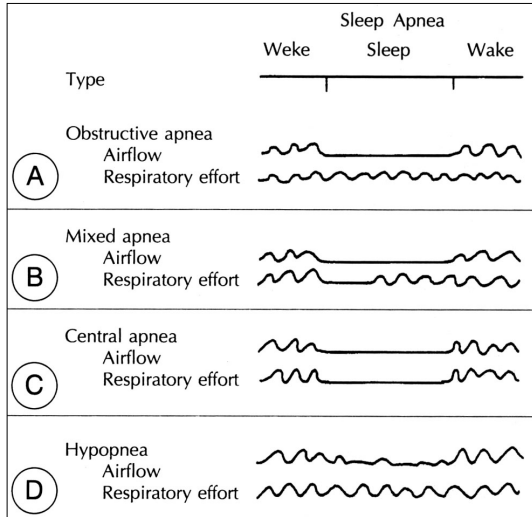


Fig. 5. Polysomnographic tracing demonstrating obstructive apnea (A), mixed apnea (B), central apnea (C), and hypopnea (D).

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가가

가 .¹²⁾

Multiple sleep latency test

Nap study

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2

4

REM

OSA

OSA

¹²⁾

방사선학적 검사

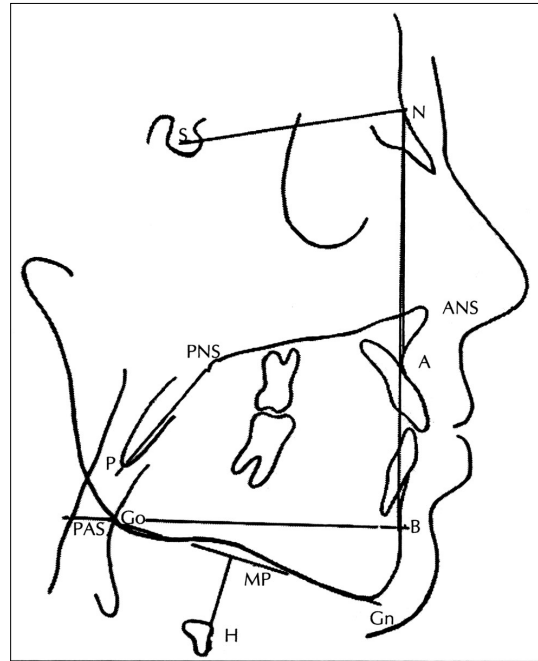


Fig. 6. Cephalometric analysis. S, sella ; N, nasion ; A, subspinale ; B, supramentale ; ANS, anterior nasal spine ; PNS, posterior nasal spine ; Go, gonion ; Gn, gnathion ; H, hyoid ; PAS, posterior air space ; P, palate.

cephalometric roentgen-

ograms, somnofluoroscopy, CT, MRI, EBT

가 가 . manometry, acoustic reflection

Cephalometric roentgenograms

Frankfort

Cream

Oesophageal

가

가

Cephalome-

try

landmark

(Fig. 6).

OSA

cephalometry

retrognathia,

¹³⁾

UPPP
 Guilleminault ¹⁴⁾ cephalometry hypopharyn-
 geal - tongue base level 가
 ultrafast MRI(30 images obtained in 30~90s at each
 location of sagittal and multilevel transverse sec-
 tions)¹⁸⁾ .

posterior airway space가 7 mm , mandibular
 plane hyoid bone 가 20 mm EBT(Electron Beam Tomography)
 UPPP 가 EBT 1984
 가
 2 CT 20
 (
 midline parasagittal section , ,)
 210
 (mandibular body)가
 가 .¹⁾

Somnofluoroscopy
 가 . 0.05
 가 4 2
 (detector) 12
 (transverse orientation) 11 cm
 cephalometry somnofluoroscopy 12
¹³⁾¹⁵⁾ Fluoroscopy CT image
 image
 (Fig. 7).¹⁹⁾

Conventional CT & MRI
 CT EBT
 가 (simulated lo-
 ngitudinal diagram)
 가 가
 MRI , CT 3 (co-
 가 , mpliance)가 가 (Fig. 8).
 가 .¹⁶⁾
 CT MRI , ,
 가 .
 3 - dimensional airway CT,¹⁷⁾ dynamic MRI, CT flu -
 $1.2 \pm 0.1R(0.31 \pm 0.026 \text{ mC/kg})$

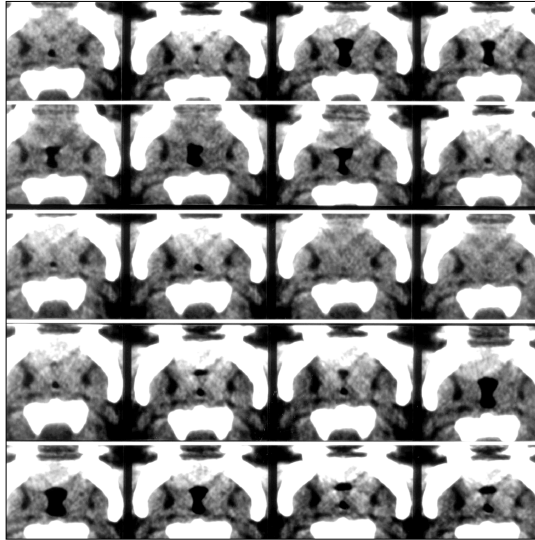


Fig. 7. EBT scans at selected level during obstructive sleep apnea. Note total occlusion of the airway. These 20 images were at 0.4sec intervals and the rest of the airway was imaged simultaneously.

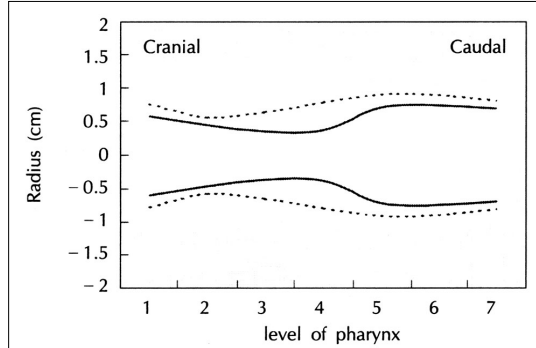


Fig. 8. The simulated longitudinal images of the oropharynx were made by transformation of the numeric data of cross-sectional area to a linear graphic display of oropharyngeal diameter. The dotted line represents maximum cross-sectional area and the solid line represents minimum cross-sectional area of the oropharynx.

oroscopy

1)2)20)

(Fig. 9).

가
가

가

가가

OSA

소아 폐쇄성 수면 무호흡증

(primary snoring), (upper airway resistance syndrome), (obstructive sleep apnea syndrome) 가

(hypoventilation), (hypoxemia)

가

21)

OSAS 가
가

원 인

가

80%가 가

22)

가 4

6

가

-

4.8~8

23)

2~6

24)

achondroplasia, facio - auriculo - vertebral sequence, Pi -

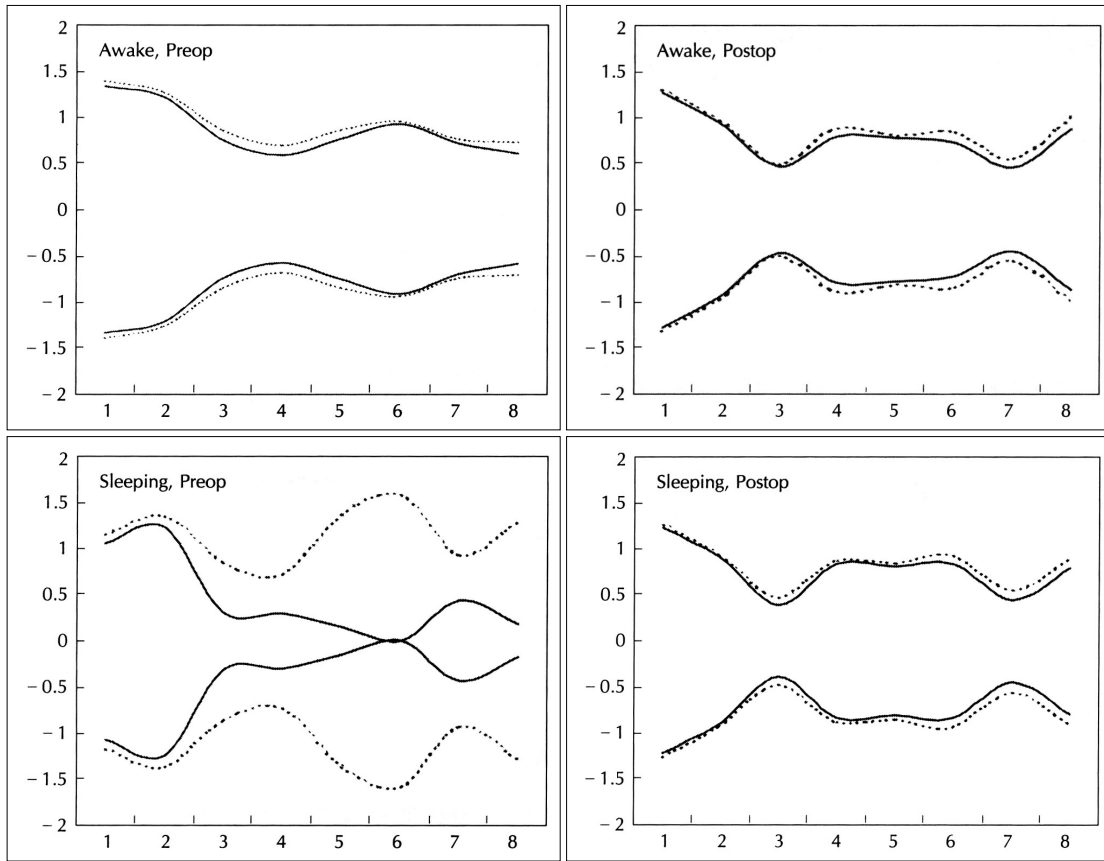


Fig. 9. The simulated diagrams show that the sites of oropharyngeal stenosis in wakefulness are not always coincident with those in sleep and the cross-sectional areas of the oropharynx change markedly with respiratory cycles. So, the upper airway should be evaluated by a dynamic imaging technique while the patient is asleep. These also show the stenosis relieved by operation (UPPP).

erre Robin, Treacher Collins, Klippel - Feil, Crouzon, 증 상
Apert
OSA

(Table 6).

OSA가

(Table 7).

dysphagia가

가 . Pharyngeal flap
(iatrogenic) ²⁵⁾ 가

nasopharyngeal cyst, tumor, encephalo-

cele

가 가

²⁶⁾

가

, neuromuscular disorder,

진 단 : OSAS, neuromuscular disorder

가 가 가 가

가 가 X-

Table 6. Manifestations of adenotonsillar hyperplasia with airway obstruction

Manifestations	Percent of patients ^a
<i>Sleep-related</i>	
Snoring	98
Breath holding	70
Fatigue during day	31
Night cough	25
<i>Daytime</i>	
Mouth breathing	75
Slow eating	60
Dry mouth	42
Trouble swallowing	37

a : Based on parental response to questionnaire for 100 patients scheduled for adenotonsilectomy for airway obstruction

Table 7. Childhood versus adult obstructive sleep apnea syndrome

	Adults	Children
Presentation		
Excessive daytime sleepiness	Main presenting complaint	Infrequent complaint
Associated obesity	Majority of patients	Minority of patients
Underweight/failure to thrive	Not seen	Frequent finding
Daytime mouth-breathing	Not seen	Frequent finding
Gender		
Enlarged tonsils and adenoids	Not seen	Frequent finding
Sleep pattern		
Obstructive	Obstructive apnea	Obstructive apnea or hypoventilation
Arousal with obstruction	Common	Not often seen
Disrupted	Common	Not often seen
Management		
Surgical	Minority of patients	Definitive therapy in most patients
Medical (positive airway pressure)	Most common management	Only in selected patients

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중심 단어 :

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