양압치료의 실제 처방

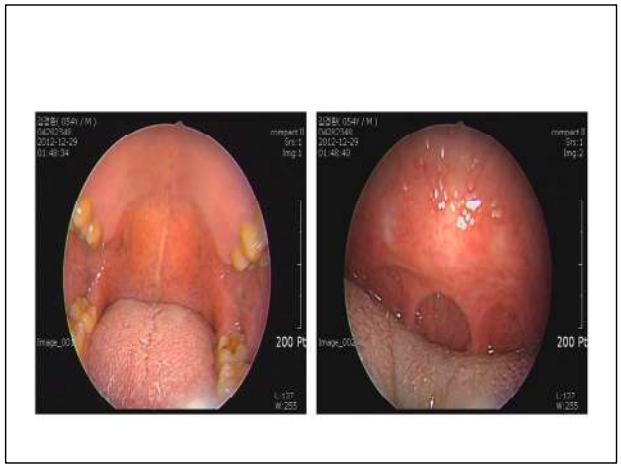
신 원 철
강동경희대병원

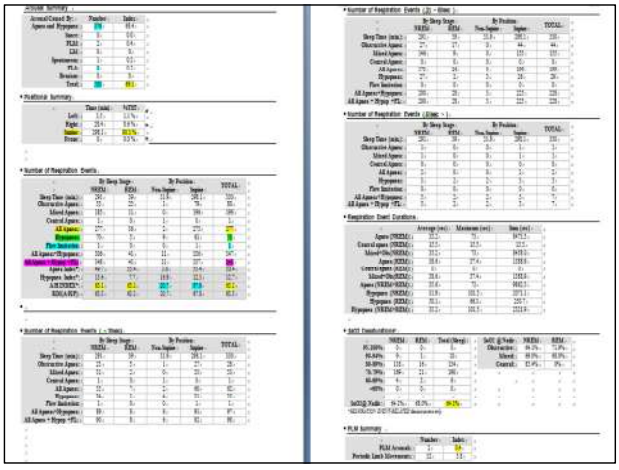
증례 ;55세 남자

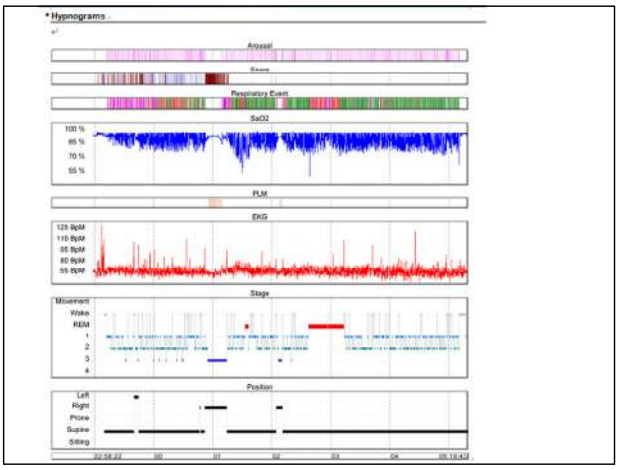
- CC: 낮에 존다./1년전부터
- snoring : 20년전부터
- sleep apnea : 5년전부터
- 수면
  - 10;30 - 12;00 취침.
  - 1분이내로 잠듬.
  - 아침 5;30 - 6;00 기상.
  - 중간에 2번 정도 깸. / 화장실 , 숨이 막혀서 깸.
  - 자고 나면, 개운하지 않음.
  - dry mouth (+) in the morning
  - EDS (++)
  - 졸음 운전 (-)
- 20년 전 코골이 수술..
- 혈압약과 아스피린; 5년 전

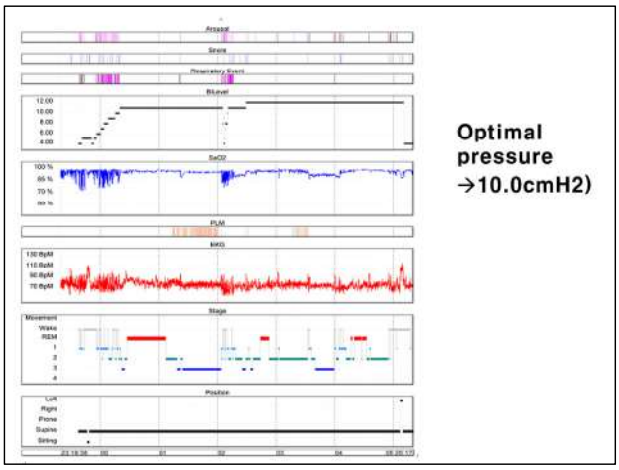
사회력>
- 담배 ; 작년 5월 금연
- 술 : 주 1회 , 주량. 소주 2병..

- Wt ; 100kg.
- 1년동안 10kg.









Diagnosis & Treatment for OSA

CPAP 처방

- **CPAP trial for 2 week**

- Machine : S9
- Nasal mask; nasal mask or nasal pillow mask, full face mask
- Pressure range : 11.0cmH2O
- C-flex or EPR: level 1
- Ramp time : 5min

CPAP treatment in OSA

- first line treatment for **moderate to severe OSA**
- almost 100% effective when used regularly but adherence with treatment poses problems for many patients

➢ reduces objective daytime sleepiness
➢ improves some measures of cognitive performance
➢ reduces depression
➢ reduces cardiovascular mortality and morbidity
➢ reduces the risk of motor vehicle crashes
➢ improves perceptions of quality of life
➢ reduces healthcare utilization

CPAP

- **Predictors of adherence to CPAP therapy**

- severity of OSA
- degree of daytime sleepiness
- socioeconomic status
- level of patient understanding of the therapy
- Type of mask used

◆ Nonadherent with CPAP : 46-83%

The basic requirements of PAP therapy

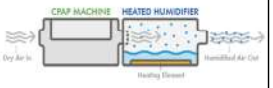
- Staff who are appropriately trained
- A choice of CPAP equipment sufficient to meet individual patient needs
- A CPAP initiation service which provides patients with adequate information and education to instill confidence in their treatment.
- A CPAP follow-up service which comprises an appropriate number of follow-up contacts and the opportunity for patients to access the service on an as-needed basis.
- An infrastructure that enables timely and efficient communication with sleep clinics and referring doctors about their patients

PAP시작 전 환자 교육

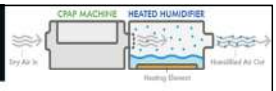
- 수면다원 검사결과와 병의 중등도를 설명한다.
- 수면무호흡증의 발생기전을 설명한다.
- 병의 자연경과와 관련된 질환을 설명한다.
- 위험인자, 악화인자를 설명한다.
- 수면무호흡증 치료방법들의 장단점을 설명한다.
- 치료를 통해서 얻을 수 있는 증상개선을 설명한다.
- 치료에 있어 환자가 해야 할 역할과 목표를 설정한다.
- 치료하지 않았을 경우에 나타날 수 있는 결과에 대해 설명한다.
- 증상개선을 평가하고 PAP사용에 대한 주기적인 점검에 대해서 설명한다.

Equipment/Therapy Interventions

- PAP modalities: CPAP, auto-titrating or bilevel PAP
- Heated humidification to relieve nasal dryness, running nose, nose bleeds
- Hose or tube
- Refit interface ; mask – nasal, oronasal, nasal pillow
- Comfort features
  - Ramp
  - Quieter blower
  - Battery backup
  - Expiratory pressure relief



Humidifier



- Cold pass-over : Increase in nasal resistance
- Heated humidification :
  - Air passing over the heated water adds moisture and humidifies the delivared air
  - Turbulnce induced in the chamber help pick up humidity

Mask의 선택

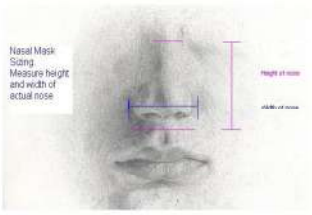
- PAP치료 성공에 매우 중요한 단계
- 고려해야 할 점
  - 얼굴의 형태에 맞는 mask의 선택
  - Mouth breathing 여부
  - 폐쇄공포증의 여부
  - 압력이 높은 경우 air leak의 가능성 여부
  - 피부의 민감도와 알러지
- Mask fitting : 다양한 종류의 마스크를 착용해서 적절한 종류를 선택하는 과정

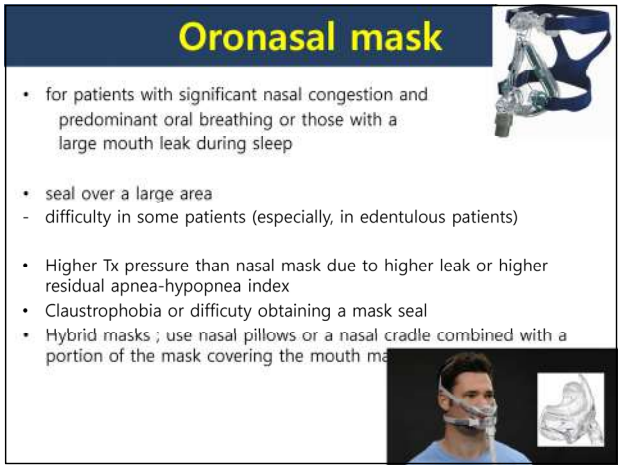
Interfaces

1. Mouthpeice
2. Nasal mask
3. Oronasal (full- face) mask
4. Nasal pillow
5. Helmet

Nasal Mask

- first interface tried for PAP titration and treatment
- Comfortable seal around the nasal bridge
- Air leak into eye
- Mouth breathing : dryness or arousal





PAP mask

Interface	Advantages	Disadvantages
Nasal	Less risk of aspiration Easier secretion clearance Less claustrophobia Easier speech May allow patient to eat Easy to fit and secure Less dead space	Mouth leak Higher resistance through nasal passages Less effective with nasal obstruction Nasal irritation and rhinorrhea, nasal congestion Mouth dryness Air leak into eyes a potential problem
Oronasal	Better control of mouth leak More effective with mouth-breathers, particularly during acute application of NPPV	More dead space Claustrophobia More risk of aspiration More difficulty in speaking and eating Asphyxiation if ventilator malfunctions
Nasal pillows	Patients with claustrophobia Intractable air leak into eyes with a nasal mask Difficult obtaining a seal over upper nasal bridge with a nasal mask No upper teeth or mustache makes obtaining a seal with a nasal mask difficult	Sensation of higher pressure in some patients Nasal irritation (saline gel may help) May not be tolerated in patients requiring high pressure

Claustrophobic reactions to CPAP

- **Almost one-third of sleep apnea patients endorse CPAP-related claustrophobia and may lead to treatment abandonment.**
- **CPAP-related claustrophobia was perceived as one of the largest deterrents to CPAP therapy.**
- **claustrophobia is composed of two "core" fears:**
  - **fear of restriction**
  - **fear of suffocation.**

Claustrophobic reactions to CPAP

- ***Exposure therapy*** (Mask desensitization)
  - **indicated for individuals with sleep apnea who are unable to tolerate CPAP devices due to anxiety reactions.**
- **CONTRAINDICATIONS :unstable psychiatric symptoms (substance use, post-traumatic stress disorder, suicidal/homicidal ideation, psychosis), inability to maintain a therapeutic relationship, or economic/domiciliary instability**
- **Nasal pillow masks are often better tolerated**

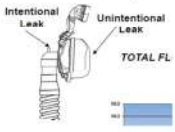
Air leak

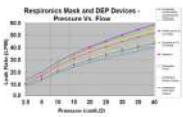
- experienced by up to 50% of nasal CPAP users
- *Unintentional leaks may be caused by mouth opening or a poorly fitting mask.*
- Higher PAP pressure

→ drop in mask pressure leading to suboptimal treatment
→ severe dryness
→ repeated arousal from noise or eye irritation
➔ poor compliance.

Air Leak

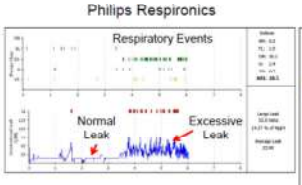
- **Intentional leak**
  - controlled leak from the port on mask interfaces that washes out CO_2 and prevents rebreathing.
  - The intentional leak of all interfaces increases as pressure increases.

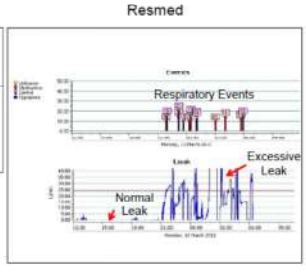




- **Unintentional leak**
  - Mouth leak
    - Pressurized air escaping via the mouth when a nasal mask is used
  - Mask leak
    - Pressurized air escaping between the mask and the face when a nasal mask or full-face/oronasal mask is used.
  - **A sudden increase in leak without a pressure change** should alert the technologist to a possible increase in mask/mouth leak.

Excessive Leak May Affect PAP Efficacy





Leak

- Leak is mask and pressure dependent
  - Fisher Paykel reports total leak
  - Resmed reports unintentional leak
  - Philips typically reports total leak (most of the time)
- Approach to abnormal Leak
  - Check circuit for leaks
- Tubes, mask, connections
  - Change/refit mask or nasal pillow insert size

Leak

- Don't use nasal pillows with pressures > 12 cm H2O
- Determine if mouth breathing is an issue
- Mask type change may alter effective pressure
  - Reduce pressure
  - Consider alternative therapy

Mouth breath

- by habit or because of nasal obstruction
- Switch from a nasal mask to an oronasal mask
- Chin-up strap
- Intensive medical treatment of nasal congestion
- Adequate humidification ; Drying of the nasal mucosa can increase nasal resistance
- Slightly lowering of pressure

Facial pain

- dental or periodontal pain(15% to 20%) ; mainly caused by direct pressure of the device on the gums
- ➔ nasal pillow mask
- Skin irritation or a rash
- CPAP mask liners that provide a soft layer between the face and CPAP mask cushion (prevent leak and irritation)
- Cloth PAP mask
- Gel nasal pad

Nasal congestion

- dry or irritated nasal passages, which can be caused by the use of nasal pillows

→saline nasal gel

- If nasal congestion worsens over the night on PAP treatment

→ clue that the patient may benefit from more humidification.

CPAP adherence

- **Adherence failure**
  - use of CPAP for less than 4 h / night on 70% of nights and or lack of symptomatic improvement
  - Internationally 5-50% of OSA reject CPAP treatment option or discontinue use within the first week
  - 12 to 25% of the remaining patients may be expected to have discontinued its use at 3 years

- **Provision of CPAP involves more than simply selling a CPAP device and mask**
  - **Education**
  - **Support and ongoing care including the monitoring of treatment adherence**
- **This is often a shared responsibility between the patient, the sleep physician, the sleep clinic and organization which provides CPAP equipment**