Nasal CPAP vs Full Face Mask: Are they Similar?

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Conflict of Interest

None

Objectives:

- Discuss the impact of breathing route on upper airway patency
- Review the differences between Nasal and Oronasal mask and their impact on PAP adherence
- Management options with emphasis on mask selection

Case Study

- 50-year-old male, presents with snoring , frequent awakenings and non restful sleep with daytime sleepiness. ESS 13
- HST : AHI 35.2/h with nocturnal hypoxemia
- Patient is scheduled for CPAP titration study.
- Patient gives history of nasal congestion and mouth breathing to the technician
- Patient is tried briefly on nasal CPAP mask and quickly changed to oronasal CPAP due to history of nasal congestion
- Study is marked by significant mask leak that results in suboptimal titration

Question: Which statement is true about Nasal Vs Oronasal CPAP mask?

- A. Nasal CPAP mask is equally effective as oronasal CPAP mask
- B. Nasal CPAP mask contributes to increased mask leak as compared to oronasal CPAP mask
- C. Oronasal CPAP mask requires lower therapeutic pressures
- D. Nasal CPAP improves CPAP adherence

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- C. Oronasal CPAP mask requires lower therapeutic pressures
- D. **Nasal CPAP improves CPAP adherence***

Background: Breathing Route and Upper Airway Patency

- **Oronasal** breathing during sleep is **very common** (59%)
- Mouth breathing **compromises upper airway patency** by

  Posterior mandibular placement **and**

  Increased upper-airway surface tension
- **Potential cause:** Jaw opening during **inspiration** may occur due to activation of **submental muscles** and tracheal tug **counterbalanced** by **masseter inspiratory activity** that is increased towards the end of obstructive apnea
- Increased association with **aging, nasal obstruction, OSA severity, neck circumference and obesity**

Effect of Nasal and Oronasal CPAP on Upper Airway Patency

- **Nasal CPAP** splints the upper airway and pushes the soft palate against the tongue

- **Oronasal CPAP** may neutralize the effect of nasal CPAP because of transmission of positive pressure in the mouth

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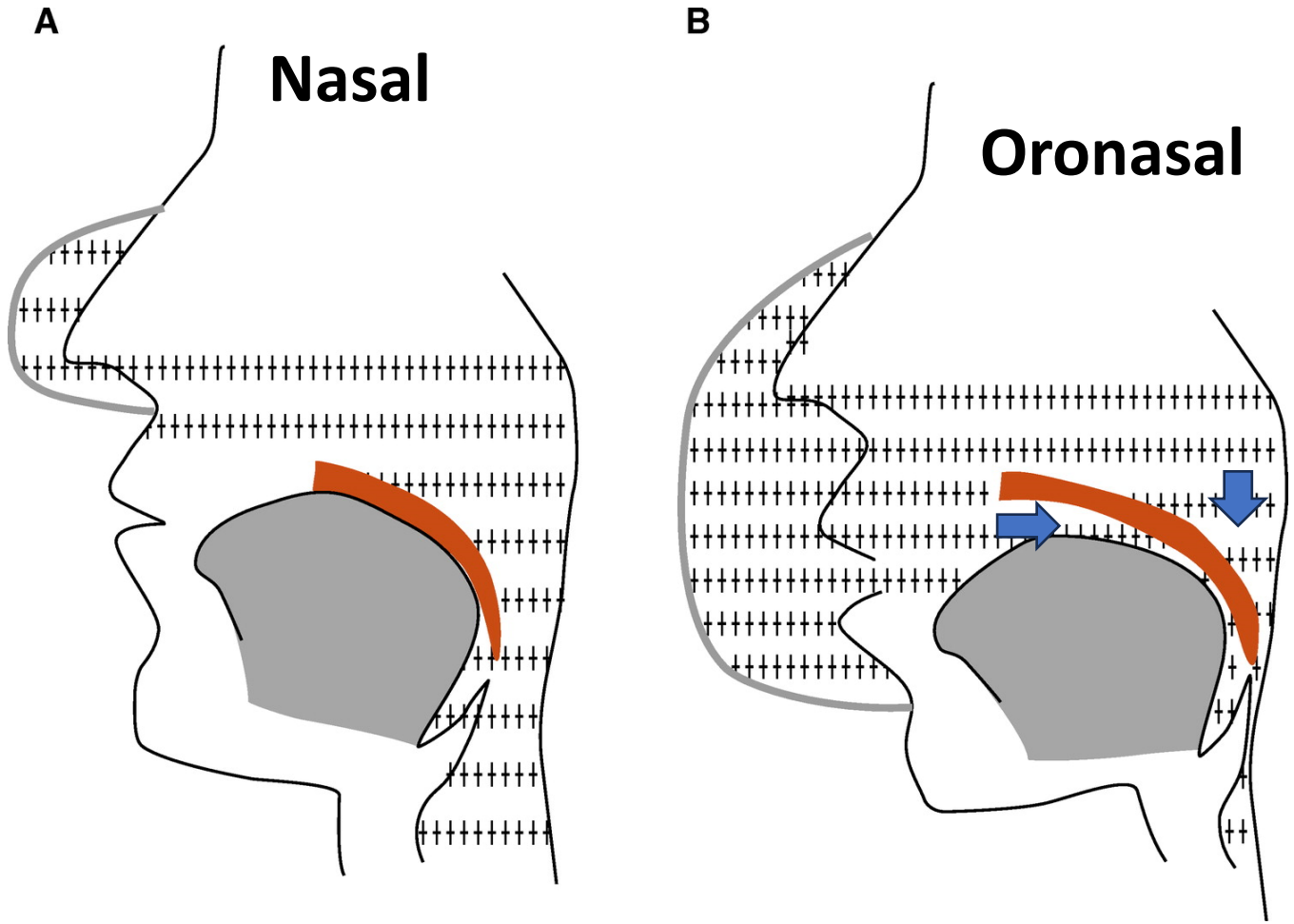

Different Mechanisms of Oral Leak during Nasal CPAP

- A. Normal breathing with no leak: **tongue and soft palate** are **coupled**
- B. **Expiratory closed mouth leak**: soft palate prolapses and blocks the nasopharynx

B a. Serial breaths with abrupt termination of expiratory flow

Saw-tooth pattern suggests **mouth leak**

- C. **Continuous** mouth leak **both** during **inspiration and expiration**

Soft palate-tongue **coupling is lost**

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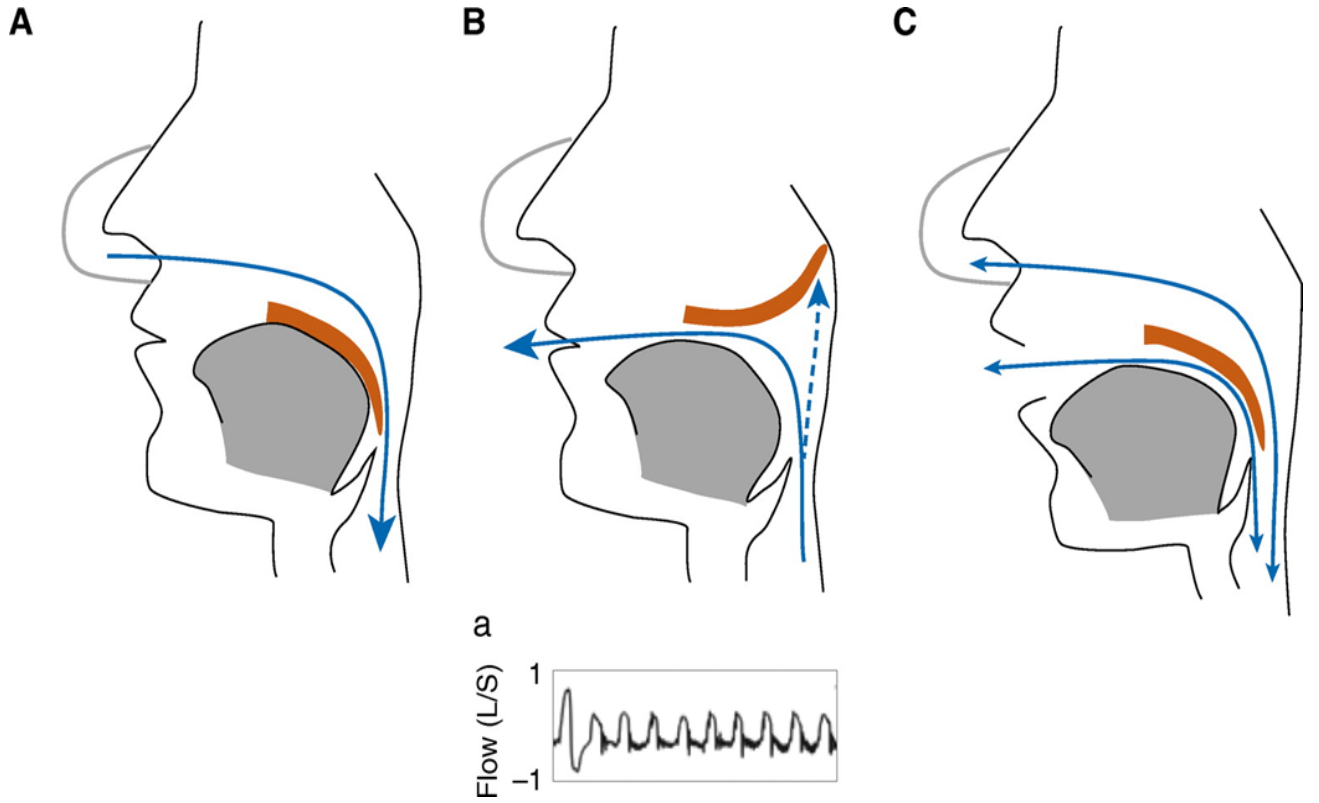


Nasal Vs Oronasal Masks

- **Nasal mask:**

  Better anchor over maxilla and nose

  Less intrusive

- **Oronasal mask:**

  Large area of contact over cheek, mouth and chin

  More intrusive

Advantages and Disadvantages of Nasal and Oronasal CPAP Masks: Current Evidence

Mask	Advantages	Disadvantages
Nasal	More comfortable	Risk of mouth leak
	Lower overall leak	
	Lower therapeutic pressure requirement	
	Higher adherence	
	Lower cost	
	Less risk of aspiration	
	Lower risk of CO_2 rebreathing	
	Lower risk of aerophagia	
Oronasal	Better control of mouth leak	Less comfortable
	Better control of REM-associated leak	Higher overall leak
		Higher therapeutic pressure requirement
		Lower adherence
		Higher cost
		Higher risk of aspiration
		Higher risk of CO_2 rebreathing
		Higher risk of aerophagia

Intentional Vs Unintentional Mask Leak

- **Intentional Leak:**

  Allows exhalation of CO2 during exhalation.

  Small leak less than 20 liters/min

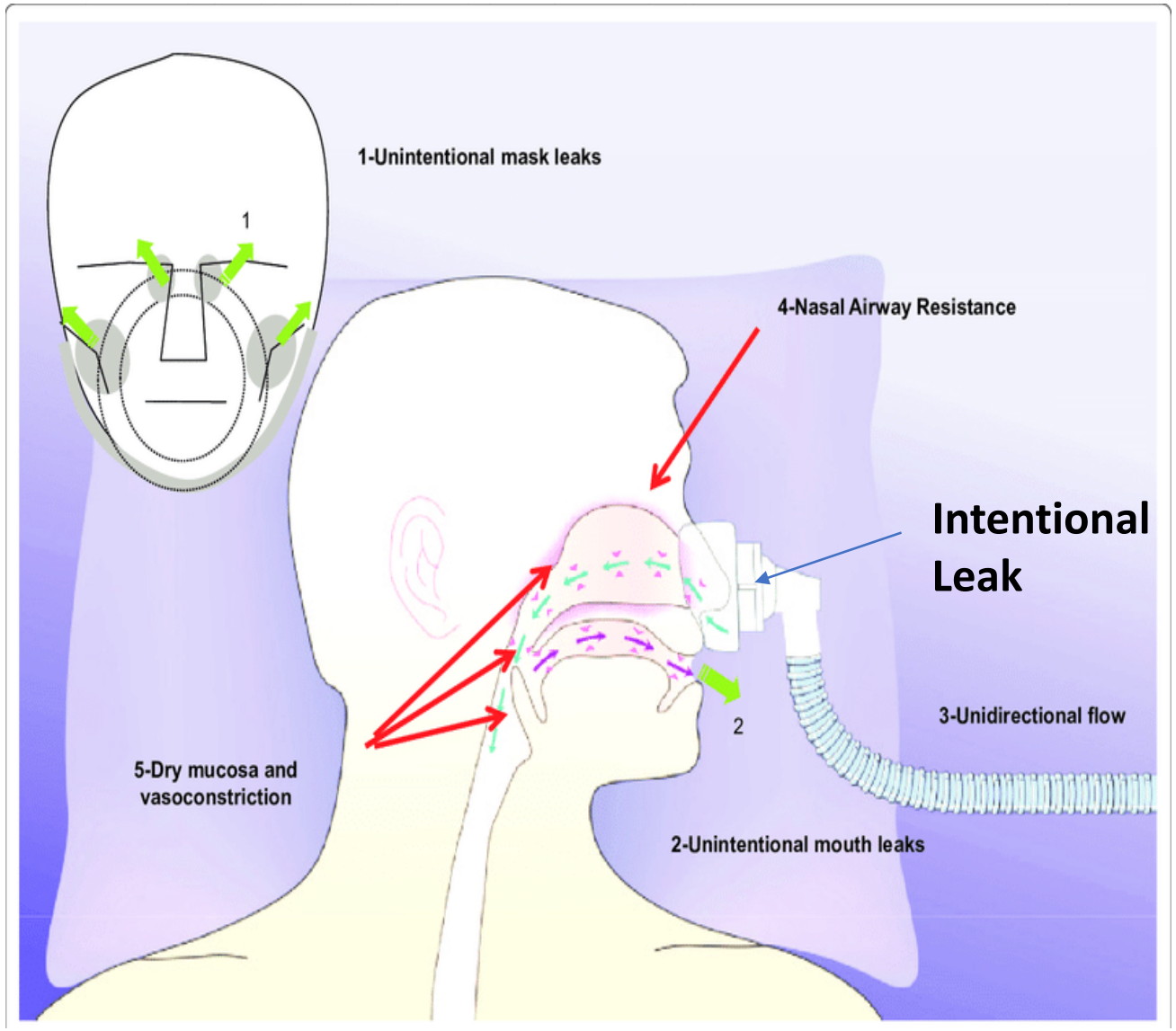
- **Unintentional Leak:**

  Leak occurs around the mask

  Noisy, blows air in the eyes

  Dry mucosa and Nasal congestion

  Reduces efficacy of PAP use



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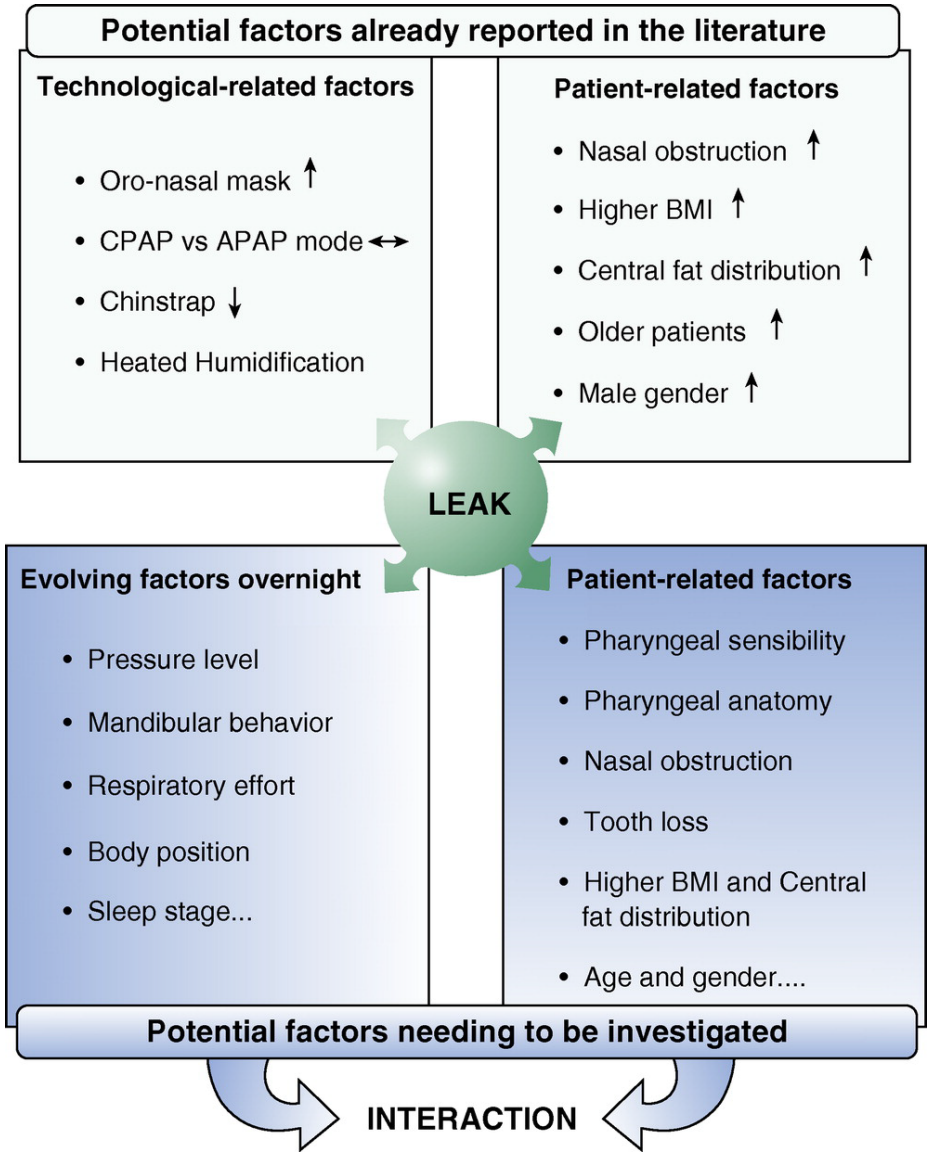
Potential Factors Affecting Unintentional Leak



Impact of Oral Breathing on PAP Adherence

- **Mouth opening** and **oral air leak** are worse in patients with nasal obstruction
- To avoid CPAP intolerance, patients with **subjective self-reported oronasal** breathing, **frequently receive oronasal** CPAP mask **even before** they have any symptoms
- Patients with **objectively detected** nasal and oral breathing, were **less adherent** to CPAP
- **Reality:** Majority of patients with OSA and **self-reported** oronasal breathing **switch to nasal breathing** while on nasal CPAP

Nasal vs Oronasal CPAP for OSA Treatment: A Meta-Analysis

CHEST 2018; 153:665-674

- A meta-analysis of **5 randomized** and **8 nonrandomized** studies (4563 patients), that reported CPAP level, residual AHI and adherence data
- Random-effects meta-analysis showed **as compared** to **nasal** CPAP, **oronasal CPAP** was associated with:

  Significantly **higher CPAP** level (on average 1.5 cm of water pressure)

  Higher residual AHI (+2.8 events/h)

  Poorer adherence (less by 48 minutes/night)

Management of Nasal Symptoms and Impact on Mask Selection

- Nasal congestion and rhinorrhea are **commonly reported in 45-69%** of patients using CPAP
- **Increased nasal resistance** on anterior rhinomanometry and **decreased cross-sectional area** at the inferior turbinate level by acoustic reflection measurement are **linked** to **lower CPAP adherence**
- **Management options:**

  Heated humidification benefits most patients

  Nasal steroids benefits only those with **allergic rhinitis**

  Nasal turbinate reduction and septoplasty does provide benefit for select patients

Patient Participation in Mask Selection

- **Mask selection process** needs to move from

Traditional disease-focused model to **Proactive self-management** model

- Patient needs to be an **Active care participant** vs **Passive care recipient**
- **Significant other or partner** of the patient needs to be involved
- Critical time to support is **before** and **first week** of CPAP use
- Cognitive behavioral interventions can be helpful
- Setting **reasonable expectations** and **timeline for acclimation**

Mask Fitting Considerations

- Several types of masks are available: Nasal , nasal pillows, nasal-oral and low-profile nasal-oral masks

Nasal mask **Full face mask**

Nasal pillows

Mask Fitting Considerations

Factors to address:

- Dismantle preconceived notions/expectations about PAP therapy
- Combat claustrophobia: **Two types**
  - Discomfort from a physical object on their face
  - Mask makes a confined space to breathe
- Oral leak may have the potential to overuse of nasal-oral mask

Avoid asking the question: Do you breathe through your mouth at night?

Instead: Observe the breathing pattern and then select the mask.

Nasal CPAP vs Full Face Mask: Summary

- Mask selection and proper fit is critical for successful PAP therapy
- Nasal and Full-face mask are not similar
- Potential benefits of Nasal CPAP mask:

More comfortable **Lower overall leak** **Lower therapeutic** **Higher adherence** **Lower cost**

Less risk of aspiration **Lower risk of CO_2 rebreathing** **Lower risk of aerophagia**

Full Face mask: **Better control of mouth leak** **Better control of REM-associated leak**

- Active patient participation with proactive self-management can improve patient adherence

Adverse PAP Effects and Adherence

- **Adverse effects of CPAP** lead to **poor adherence**
- **Factors affecting CPAP adherence include:**

Early usage – excellent **predictor of long-term use**

Nasal passage size, nasal resistance and inferior cross-sectional area

Excessive air leak and mask intolerance related to dry mouth, nasal congestion

Cochrane systematic review assessed: heated humidification, APAP, bilevel and expiratory relief.

Auto PAP only was shown to **significantly** improve adherence