# *Craniofacial Analysis (sample case)*

**Patient:** **DOB:** **Initial Exam Date**:

**Referring Doctor:**

**Patient's Primay Dental/Medical Concerns:**

1. Mouth breathing
2. Daytie fatigue
3. Daytime sleepiness
4. Orthodontic relapse of lower anterior teeth
5. Chronic nasal congestion

**Sleep Study:** Patient has not had a sleep study

**Midface Development**

**Anterior/Posterior (Modified Sassouni, Jarabak, and Steiner Analysis)**

A/P

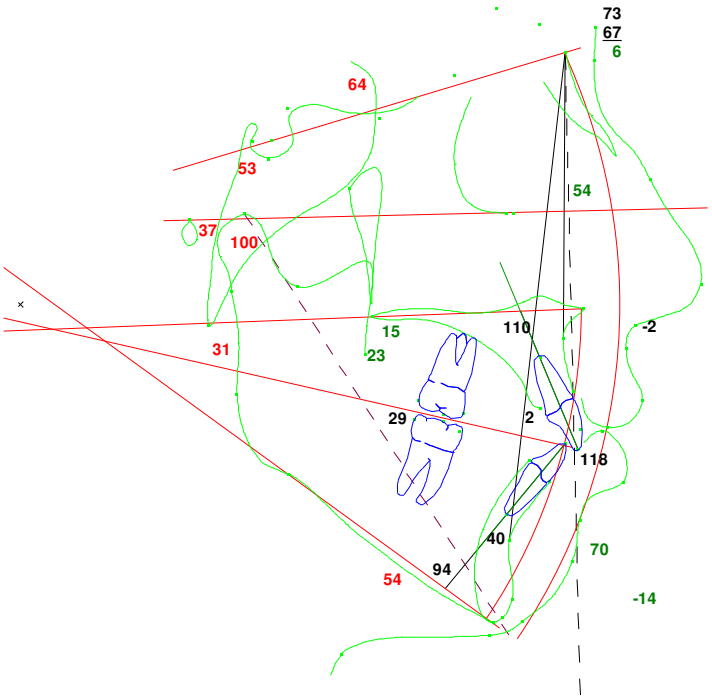
- Moderately retrognathic maxilla
- Severely retrognathic mandible

Vertical

- Steep occlusal plane
- Severely steep mandibular plane

Mandible

- Severely underdeveloped mandible
    - Ramus height
    - Mandiublar base
    - Overall length
- Likely compression of TMJs due to muscle parafunction



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| Group/Measurement | Value | Norm | Std Dev | Dev Norm |
|---|---|---|---|---|
| **Skeletal A/P** | | | | |
| SNA (°) | 72.9 | 82.0 | N/A | N/A |
| SNB (°) | 66.8 | 80.0 | N/A | N/A |
| ANB (°) | 6.1 | 2.0 | N/A | N/A |
| Wits Appraisal (mm) | 1.7 | -0.4 | 2.5 | 0.8 |
| Maxillary Skeletal (A-Na Perp) (mm) | -1.8 | 1.0 | 3.1 | -0.9 |
| Mand. Skeletal (Pg-Na Perp) (mm) | -13.8 | -2.0 | 5.3 | -2.2 ** |
| **Skeletal Vertical** | | | | |
| SN - MP (°) | 52.7 | 33.0 | 6.0 | 3.3 *** |
| FMA (MP-FH) (°) | 37.3 | 21.9 | 3.2 | 4.8 **** |
| Palatal Plane-Occ Plane (PP-OP) (°) | 14.9 | 10.0 | 4.0 | 1.2 * |
| Occ Plane to Mand Plane (OP-MP) (°) | 23.3 | 17.4 | 5.0 | 1.2 * |
| L1 - Menton (mm) | 40.4 | 40.0 | 5.0 | 0.1 |
| **Mandible** | | | | |
| Mandibular length (Co-Gn) (mm) | 100.3 | 122.3 | 4.0 | -5.5 **** |
| Ramus Height (Ar-Go) (mm) | 30.8 | 45.6 | 3.8 | -3.9 *** |
| Length of Mand Base (Go-Pg) (mm) | 53.6 | 73.0 | 3.0 | -6.5 **** |
| **Dental** | | | | |
| U1 - Palatal Plane (°) | 110.2 | 110.0 | 5.0 | 0.0 |
| Interincisal Angle (U1-L1) (°) | 117.9 | 131.0 | N/A | N/A |
| IMPA (L1-MP) (°) | 93.7 | 93.0 | N/A | N/A |
| Occ Plane to SN (°) | 29.4 | 14.0 | N/A | N/A |
| **Craniofacial** | | | | |
| Saddle/Sella Angle (SN-Ar) (°) | 121.6 | 124.0 | 5.0 | -0.5 |
| Articular Angle (Ar-S-Go) (°) | 162.0 | 140.3 | 6.0 | 3.6 *** |
| Lower Face Height (ANS-Gn) (mm) | 69.9 | 65.0 | 4.5 | 1.1 * |
| Upper Face Height (N-ANS) (mm) | 53.9 | 50.0 | 2.5 | 1.5 * |
| Anterior Cranial Base (SN) (mm) | 64.2 | 75.3 | 3.0 | -3.7 *** |

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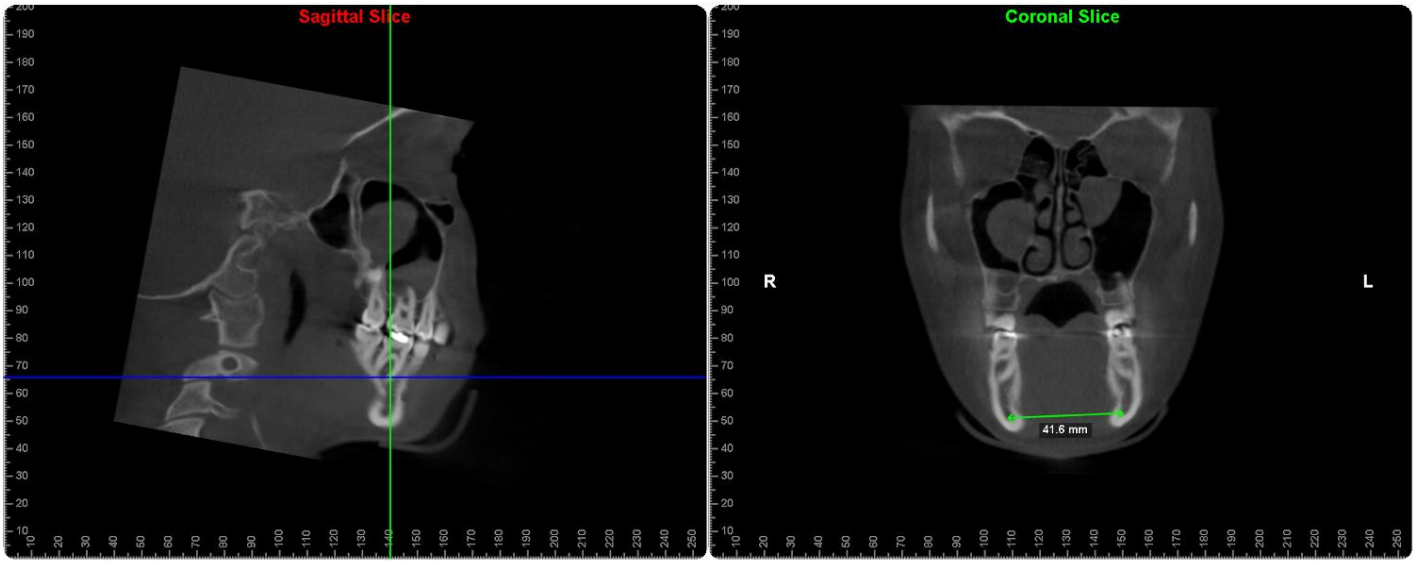
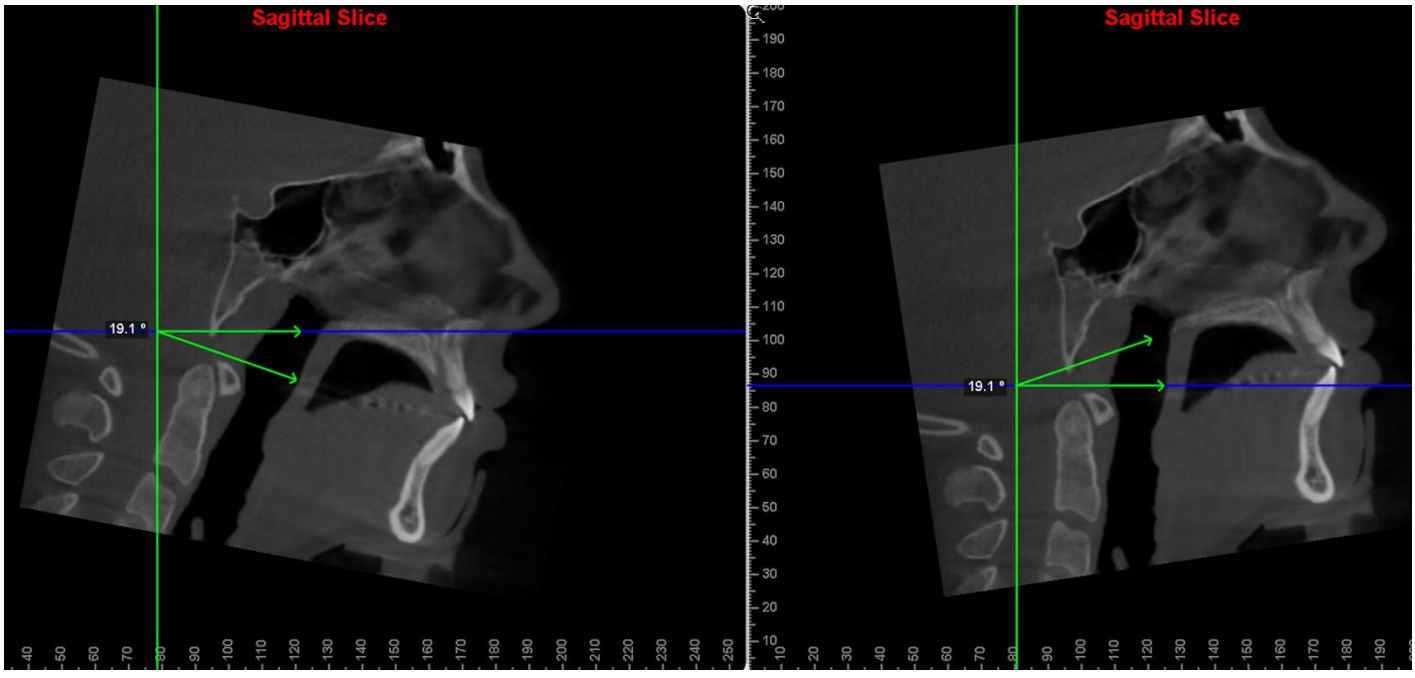
**Transverse (Dane's Analysis)**

Mandibular base measured at coronal sectional through mesial root apex of mandibular first molar (average range: 50-52 mm)
41.5 mm underestimates mandilbar width due to the severely steep mandibular plane angle




Mandiubular base measured with mandibular plane angle corrected ~19 degrees per SN-MP norm (see tracing measurements)



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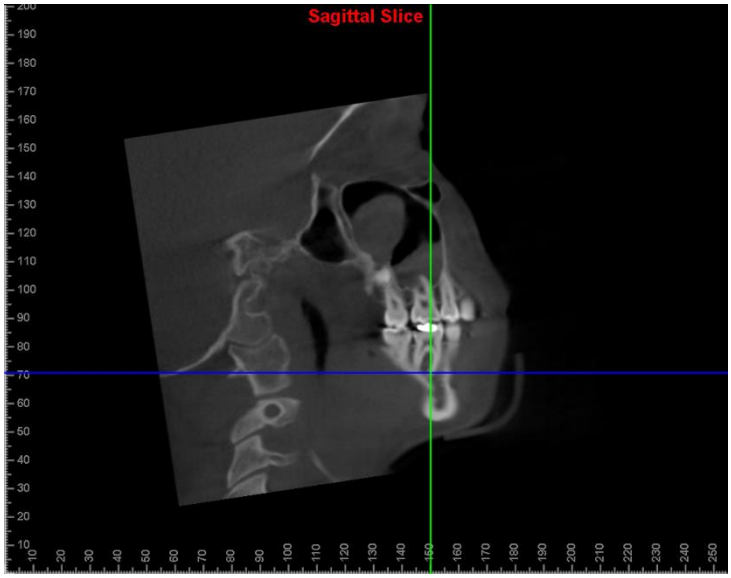
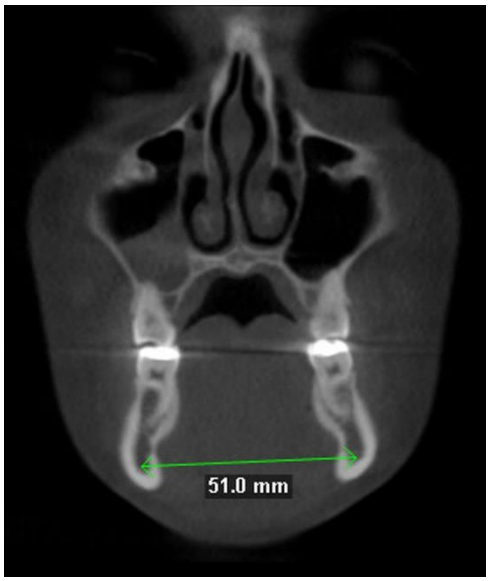
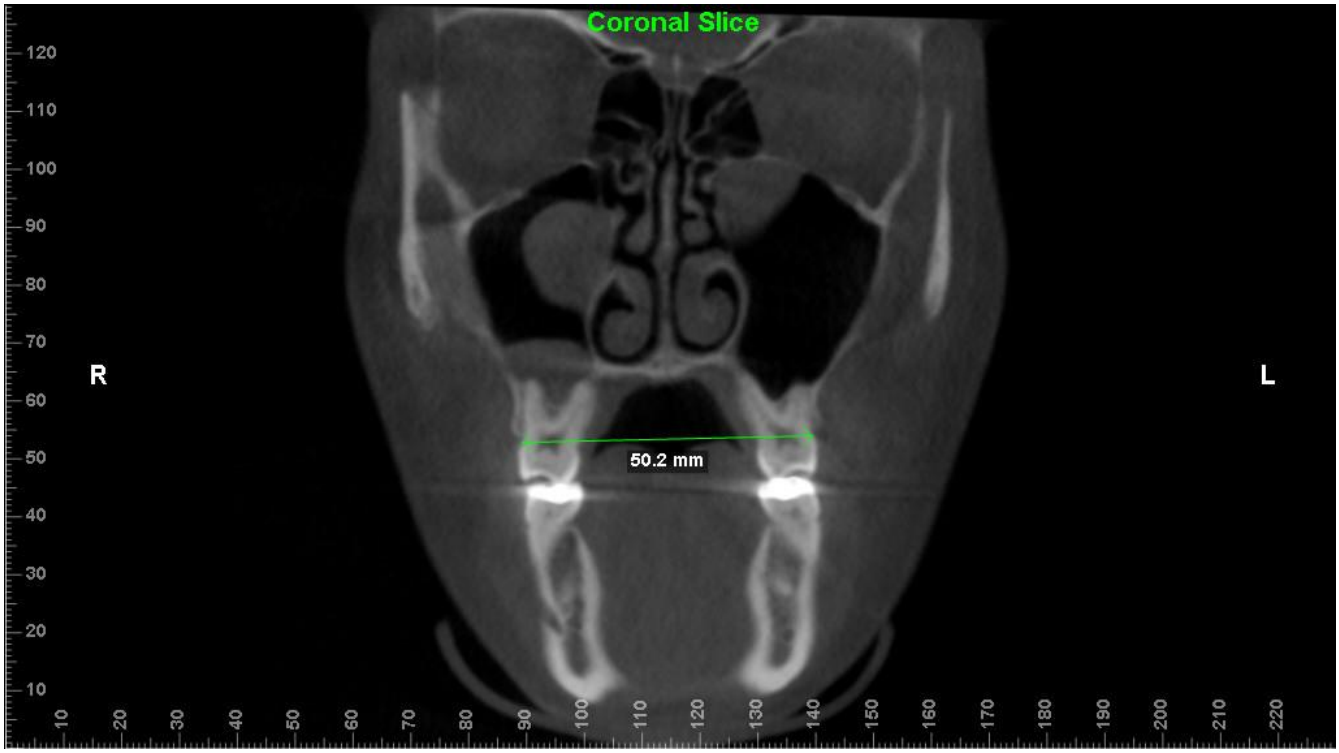
# *Craniofacial Analysis (sample case)*

Width of 51 mm is an average mandibular width




Width of maxilla measured at buccal CEJ of maxillary first molars. With a mandibular base measurment of 51 mm, the maxillary widith should be ~60 mm. This indicates a maxillary skeletal transverse deficiency of ~9 mm.



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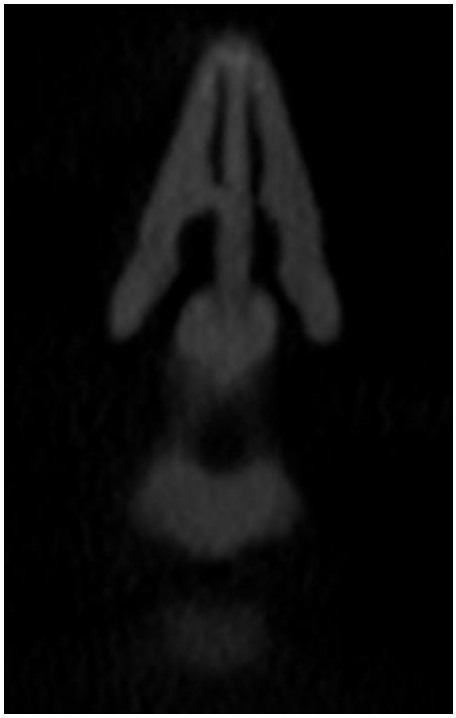
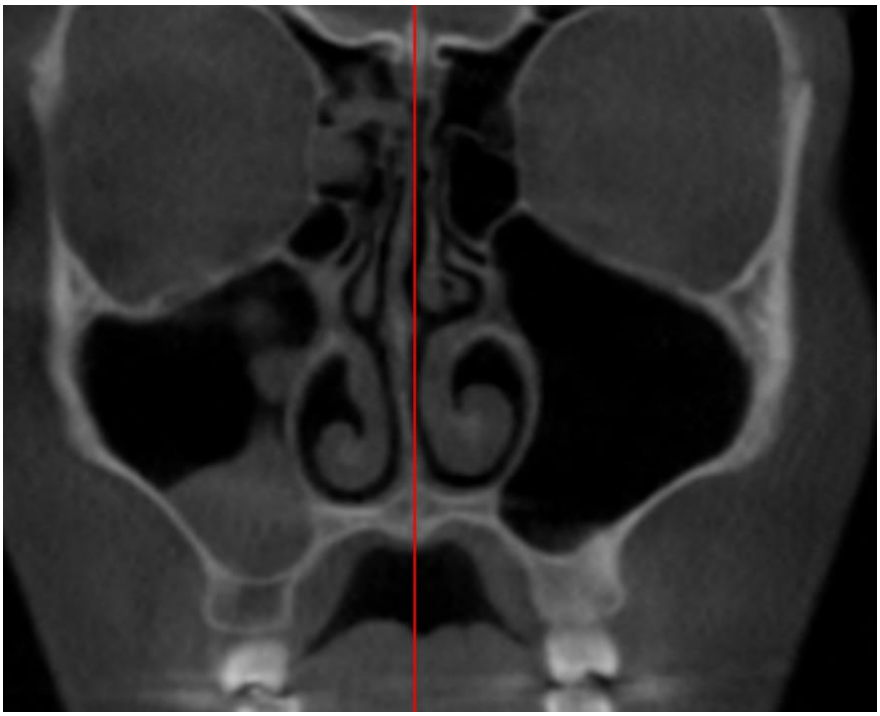
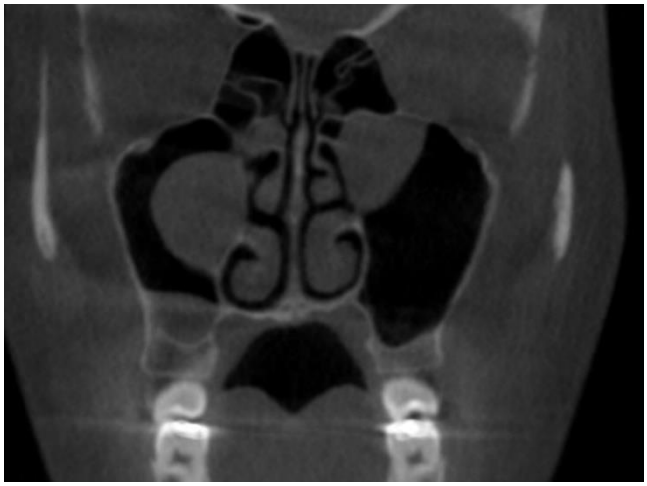
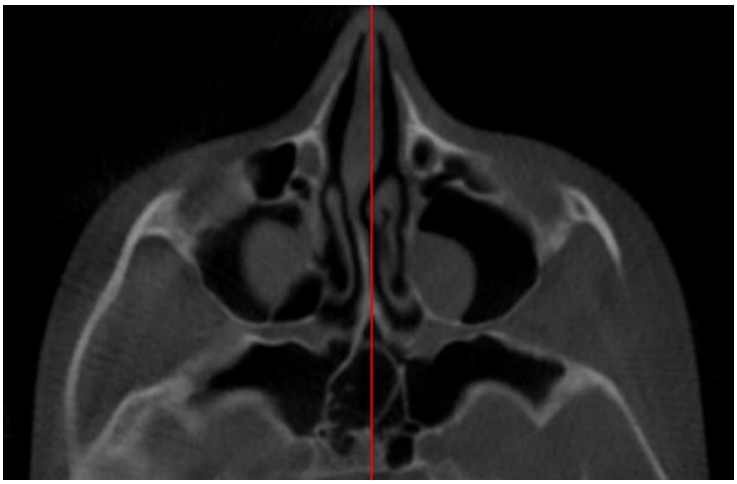
# *Craniofacial Analysis (sample case)*

**Nasal Airway**





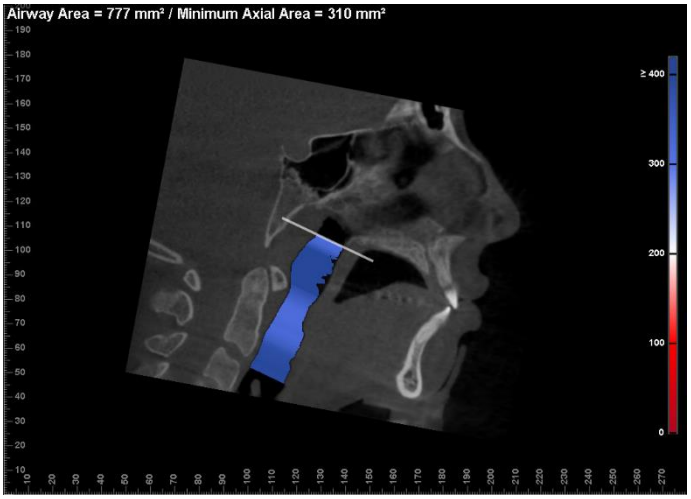




- Suspected nasal valve stenosis
- Suspected deviated septum (more evident in axial view)
- Generally narrow nasal passage (could be due to maxillary transverse deficiency)
- Sinus pathology (possibly mucous retention cysts)
- Low tongue posture

# *Craniofacial Analysis (sample case)*

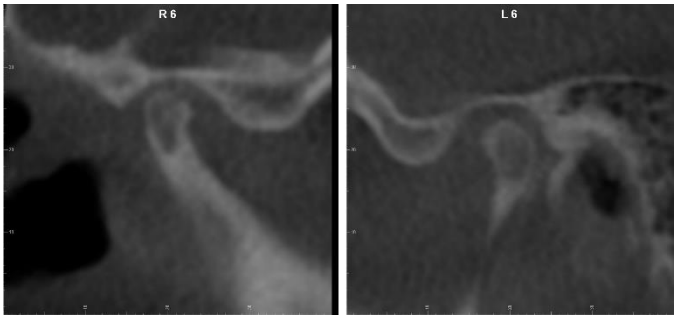
**Pharyngeal Airway**

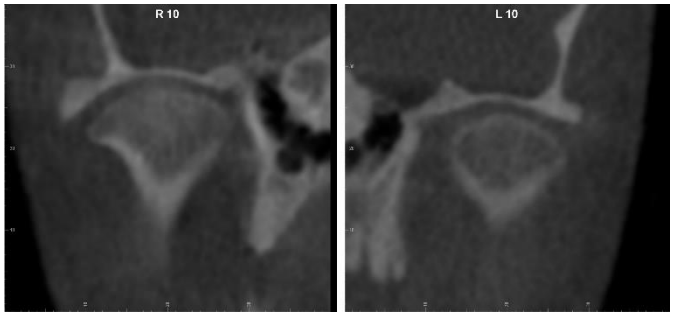




- Pharyngeal airway has excellent volume (minimal cross-sectional area of 310 $mm^2$)
- Suspected forward head posture
- Significance of low tongue posture evident in this view

**TMJ**



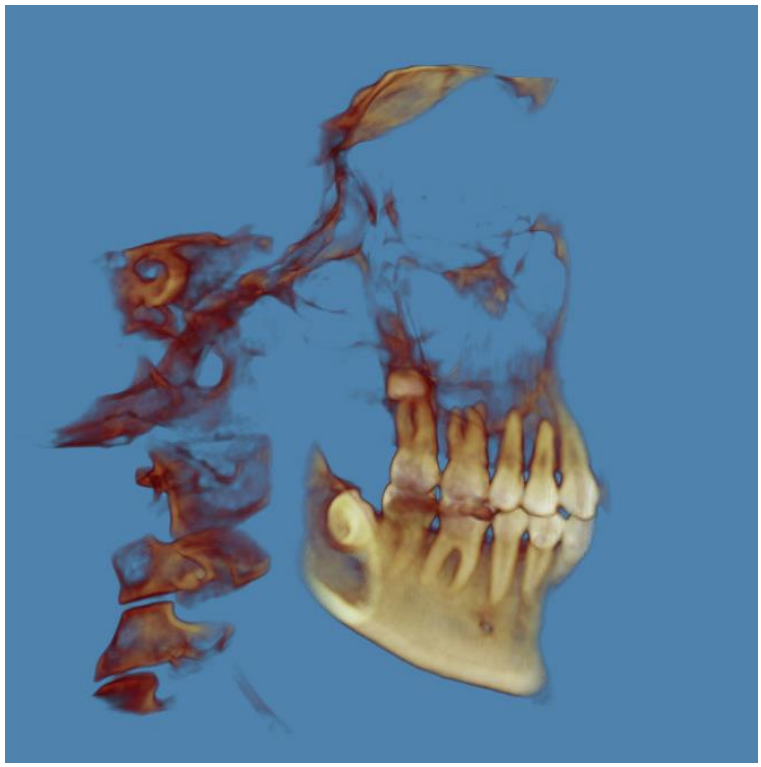



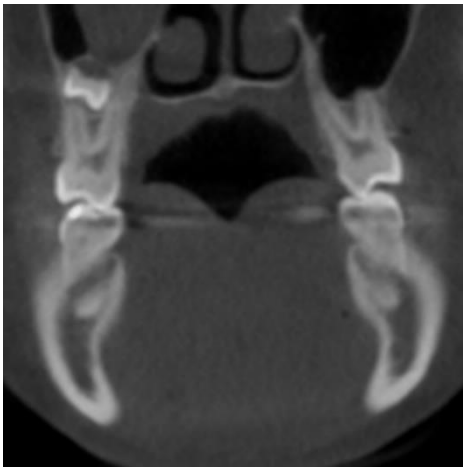

- Both condyles posterior in fossa
- Minimal superior joint space for both condyles
- Superioanterior aspect of right condyle appears to have an erosive defect, higher resolution scan indicated

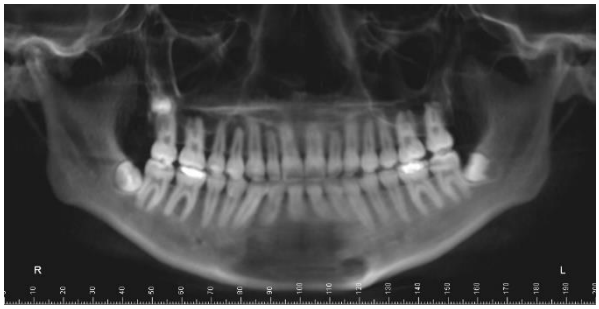
# *Craniofacial Analysis (sample case)*

**Other**

Impacted 3rd molars. This image shows the horizontally impacted #32 and the very strange impaction of #1, direclty superiror to the roots of #2. These impactions are highly indicative of the retrognathic nature of both the maxilla and the mandible. See 3rd molars lisited in Table 2 from Dr. Guilleminault's 2005 publication (attached below).







**Diagnosis**

- Maxillary transverse deficiency of ~9 mm
- Bimaxillary retrognathia
- Underdeveloped/ mandible
- Steep occlusal and mandbiular planes
- Suspected nasal valve stenosis
- Susptected deviated septum
- Poor condylar position, minimum superior joint space
- Chronic mouth breathing (awake and asleep)

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**Further Records/Data**

- Check for tonge tie and tongue range of motion
- Check for TMJ function
    - Range of motion
    - Deflection/deviation on opening
    - Joints sounds/vibrations
- Screen with subjective tools
    - StopBang
    - Nose Score
    - Epworth
- Screen with questionairre for syptoms related to airway obstruction (see Table 2 below)
- Rhinometry and/or rhinomanometry if accessible (specialized equipment)

**Referrals to Consider**

- ENT
- Sleep Physician

**Treatment Recommendations**

The primary goal is to help this patient convert to nasal breathing with proper resting tongue position. An ENT and myofunctinoal therapist may be able to help. If not, the nasal airway volume can be improved with maxillary development. Due to the steep mandibular plane angle and increased lower facial height, lip seal will be challenging without changing skeletal relationships. I can see two different treatment approaches:

1) ENT and myofunctional therapy
    a. Work towards nasal breathing while awake and sleeping
    b. Moninotor TMJ function and health
    c. Consider night time appliance to support TMJs and pharyngeal airway if indicated
    d. Consider genioplasty with advancement and superior positioning to assist with lip seal

2) Midface Development
    a. Maxilllary skeletal expansion with improvement in nasal volume (including nasal valve area)
    b. Counterclockwise rotation of maxilla and mandible with limited advancment of the maxilla and signiciant advancement of the mandible (also consider genioplasty)

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**Other Notes**

- Based on the pharyngeal airway volume, the risk of OSA is low. However, due the skeletal deficincies, and if there are symptoms related to airway obstruction, a sleep study may be indicated. If the sleep study is postive for a SRBD, that diangostic information will be critical to the treatment planning decisions.

- Some ENTs use a procedure called an antrostomy to clear nasal pathology. I prefer more conservative approaches such as balloon sinuplasty. I advise consulting with an ENT prior to any surgical procedures for your patients.

Thank you kindly for submitting this case. Please call or email if you have any questions, comments, or concerns.

Blessings,

Eric Phelps, DDS, MS

Diplomate:
American Board of Orthodontics
American Board of Dental Sleep Medicine

**If you are interested in a comprehensive orthodontic and dentofacial orthopedic treatment plan you can find the link on the Radiodontics website. Standard facial and intraoral orthodontic photos are requested.**

**Table 2. Syndromes Related to Abnormal Breathing During Sleep**

| |
|---|
| Chronic snoring |
| Daytime fatigue |
| Daytime sleepiness |
| Sleep maintenance insomnia |
| Sleep-phase delay |
| Confusional arousal |
| Sleep talking |
| Sleep terror |
| Sleepwalking |
| Enuresis (primary or secondary) |
| Morning headache |
| Nocturnal migraine |
| Periodic limb movement |
| Learning or memory problem |
| Attention-deficit/hyperactivity disorder |
| Abnormal social contact (psychologically withdrawn) |
| Depressive affect |
| Hypotension with orthostasis |
| Fainting (rare) |
| Hypertension (rare) |
| Cor pulmonale (rare) |
| Nocturnal asthma or nocturnal wheezing |
| Crossbite |
| Pathologic overjet |
| Overcrowding of teeth |
| Impacted wisdom teeth |

Guilleminault, et. al., Arch Pediatr Adolesc Med. 2005; 159: 775-785