RADIOGRAPHIC EVALUATION OF THE NASAL CAVITY, PARANASAL SINUSES AND NASOPHARYNX FOR SLEEP-DISORDERED BREATHING

Dania Tamimi, BDS, DMSc
Diplomate, American Board of Oral and Maxillofacial Radiology
ROLE OF CBCT

- To discover the anatomic truth
DISCOVER FACTORS THAT

- Lead to Abnormal Upper Airway Anatomy
- Increase Resistance
- Cause Turbulent or Laminar Air Flow
- Increase Collapsibility
- Airway lumen
- Soft tissue component
- Osseous component
CHECKLIST – EVALUATE FOR

- Nasal obstruction
- Sinus pathology
- Nasopharynx pathology
- Oropharyngeal morphologic predisposing factors and pathology
- Maxillary and mandible morphologic predisposing factors
- TMJs
- Hyoid bone position
- Evaluate for Head position (false positive or negative)
- C-spine for pathology
- Cranial base
CHECKLIST – EVALUATE FOR

- Nasal obstruction
- Sinus pathology
- Nasopharynx pathology
- Oropharyngeal morphologic predisposing factors and pathology
- Maxillary and mandible morphologic predisposing factors
- TMJs
- Hyoid bone position
- Evaluate for Head position (false positive or negative)
- C-spine for pathology
- Cranial base
NASAL CAVITY AND SINUSES

- Patency of external and internal nasal valves
- Morphology of nasal septum
- Morphology and symmetry of turbinates
- Patency of sinus drainage pathways
- Presence of sinonasal pathology
THE NOSE HAS THREE MAJOR FUNCTIONS

1. Breathing
2. Olfaction
3. Conditioning the air
THE NASAL VALVE

• Turbulence distributes the air in the nasal fossa for conditioning and olfaction.

• When there is stenosis of the nasal valve, turbulence is lost and airflow becomes laminar.

• Without turbulent flow the patient has the perception of nasal obstruction.
EXTERNAL NASAL VALVE

- Major Alar Cartilage:
  - Lateral Crus
  - Medial Crus
- Septal nasal cartilage
- (Quadriangular cartilage)
INTERNAL NASAL VALVE

The Internal Valve

- caudal border of upper lateral cartilage
- septum
- anterior head of inferior turbinate

> 10-15°
EVALUATING THE INTERNAL NASAL VALVE

Courtesy: Chuck Schatz MD
NASAL OBSTRUCTION: POST-RHINOPLASTY
Hockey player who took a stick to his face
HISTORY OF “NASAL OBSTRUCTION”

Not adequate to demonstrate the nasal valve
PYRIFORM APERTURE
NASAL CAVITY BOUNDARIES

Evaluate transverse dimension of the nasal cavity

Cribiform plate of the ethmoid
Ethmoid air cells
Maxillary sinuses
Nasal septum
NASAL SEPTUM

- Composition:
  - Ethmoid bone
  - Vomer bone
  - Septal cartilages

Gray's Anatomy
NASAL CAVITY: SEPTUM

Anterior  Mid  Posterior
NASAL SEPTAL DEVIATIONS

• “SCAN” your nose
  • S deviations
  • C deviations
  • A nterior dislocations
  • N asal spur (Cartilagenous or bony)
NASAL SEPTUM VARIATIONS

- Deviation
- Septal spurs
  - Usually occur at junction of the Vomer and septa cartilage
  - May touch or perforate the lateral wall of the nasal cavity or inferior nasal turbinate.

Courtesy M. Michel, MD
LATERAL NASAL WALL

- Turbinates
  - Inferior
  - Middle
  - Superior
DRAINAGE

- **Meati:**
  - **Middle**
    - Frontal, Ant Ethmoid and Maxillary Sinuses
  - **Superior**
    - Sphenoethmoidal recess
    - Posterior Ethmoid
  - **Inferior**
    - Nasolacrimal duct
RADIOGRAPHIC VISUALIZATION OF DRAINAGE PATHWAYS

- Frontal Recess
Sphenoethmoidal Recess
- Ostiomeatal unit (infundibulum)
• Haller Air cells
TURBINATE VARIATION

- Concha Bullosa
• Nasal Cycle (Every 2-6 hours)
• Paradoxical nasal turbinates
POST SINUS PROCEDURES

www.emptynosesyndrome.com
EMPTY NOSE SYNDROME?

- Excess removal of mucosa, turbinates, leading to disordered laminar flow
- Systemic & local Sxs
  - Nasal dryness
  - Sinusitis
  - Crusting
  - Foul smell

http://Emptynosesyndrome.org
NASOLACRIMAL DUCT
CRIBRIFORM PLATE OF ETHMOID
CRIBRIFORM PLATE OF ETHMOID
POSTERIOR NASAL SPINE AND APERTURE
CHECKLIST – EVALUATE FOR

- Nasal obstruction
- Sinus pathology
- Nasopharynx pathology
- Oropharyngeal morphologic predisposing factors and pathology
- Maxillary and mandible morphologic predisposing factors
- TMJs
- Hyoid bone position
- Evaluate for Head position (false positive or negative)
- C-spine for pathology
- Cranial base
NASOPHARYNX

- Soft tissue assessment
  - Size and morphology of adenoids
  - Effect of adenoids on airway lumen
  - Morphology of fossa of Rosenmüller/
    torus tubarius

- Hard tissue evaluation
  - Skull base flexion
  - Clivus
WALDEYER’S RING

- Adenoids
- Tubal tonsils
- Palatine tonsils
- Lingual tonsils
PROGRESSION OF ADENOID DEVELOPMENT

- Adenoids not visible at birth
- Reach peak size at 5 years of age
- Continues to age 12 years
- Diminishes sharply at 16 years of age.
• Eustacian tube opening

• Fossa of Rosenmuller
SKULL BASE FLEXION

Normal: 125°-143°
Platybasia: > 143°
Basilar kyphosis: < 125°