MANAGEMENT OF THE ANOMALOUS PEDIATRIC AIRWAY

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PEDIATRIC AIRWAY

- Small
- Soft
- Pliable
- Vulnerable to minimal manipulation:

  Minor obstructive changes may lead to serious and potentially fatal conditions (reduction of neonatal glottis by 1mm decreases airway by 40%).

- STRIDOR is the most common presentation of children with an Anomalous Airway.

STRIDOR:

- Harsh "musical sound"
- Baby's cry for help
- A symptom not a diagnosis
- Turbulent airflow through a partially obstructed airway
- Three types

EVALUATION OF STRIDOR:

- History
- Physical Examination
- Radiographic Studies
- Endoscopy

ETIOLOGY OF STRIDOR:

- **Multiple:** More than 40 different etiologies in children
- **Classification:**

  A. **Anatomic Region**

     - Nasal and/or pharyngeal
     - Laryngeal
     - Tracheal and/or bronchial

  B. **Underlying Cause:**

     - Congenital
     - Inflammatory
     - Traumatic
     - Neoplastic

  C. **Type of Obstruction:**

     - Extrinsic
     - Intrinsic

MANAGEMENT OF STRIDOR

DEPENDS:

- **Severity**
- **Underlying Etiology**
- **Age**
- **Associated problems**

CLASSIFICATION:

Immediate: **Epiglottitis, Foreign Body...**

- **Intubation**
- **Tracheotomy**
- **Endoscopy**

Medical:

- **Observation**
- **Antibiotics**
- **Steroids**

Surgical:

- **Laser**
- **Cricoid Split**
- **Tracheotomy**
- **Laryngotracheoplasty with rib graft**

LARYNGEAL ANOMALIES

LARYNGEAL ANATOMY:

- Larynx arises from the 4th and 6th bronchial arches
- Larynx appears at 4th week of development
- Tracheoesophageal septum develops by the 6th fetal week
- Location:

  C-4 Birth

  C-7 Adult

- Size: Neonatal = 1/3 adult
- In infant cricoid/subglottis is the narrowest portion of the larynx
- Function:
  - Protection
  - Phonation
  - Breathing

LARYNGOMALACIA

- Most common congenital laryngeal anomaly
- Stridor: worse supine, better prone
- Usually disappears by the age of 2 years
- Flabby supraglottic structures

Diagnosis:

- Fluoroscopy
- Direct laryngoscopy

Treatment:

- Mild-moderate:
  - No specific therapy:

    (Observation, early RX of URI)
  - Resolution by 2 years
- Severe:
  - Epiglotopexy
  - Tracheotomy (rare)

VOCAL CORD PARALYSIS:

- Second most common laryngeal anomaly
- Frequently present at birth
- Not truly a developmental anomaly

Bilateral

- Cry may be normal
- Stridor increase with activity
- High pitched crowing
- Inspiratory stridor
- More common than unilateral

Unilateral

- Weak cry
- Mild inspiratory stridor
- Left: Thoracic and/or C/V anomalies

  Right: CNS abnormalities

Treatment:

Bilateral:

- Tracheotomy
- Nerve-muscle pedicle
- Lateralization

Unilateral:

- Observation

CONGENTIAL SUBGLOTTIC STENOSIS:

- Inspiratory and expiratory stridor
- Third most common laryngeal anomaly
- Soft tissue thickening of subglottic area
- Possible cyanosis
- Recurrent croup
- Possible association with other congenital lesions and syndromes

DIAGNOSIS:

- Radiographically: A-P and lateral neck
- Endoscopy:
  - Confirmed if a 3mm infant bronchoscope cannot be readily passed in a full-term newborn

TREATMENT:

- Observation
- Cricoid split
- Tracheotomy

ACQUIRED SUBGLOTTIC STENOSIS:

- Acquired with intubation
- Tracheotomy generally required in 90% of cases
- Decreasing incidence associated with improved airway management

MANAGMENT:

- Observation
- Anterior/posterior cricoid split
- Auricular cartilage graft
- Costal cartilage graft
- Tracheotomy

SUBGLOTTIC HEMANGIOMA:

- Symptomatic after birth
- Most common neoplasm of the larynx in children
- May be associated with other hemangiomas

DIAGNOSIS:

- X-ray: Subglottic narrowing/mass
- Endoscopy

ENDOSCOPIC FINDINGS:

- Smooth compressible mass below posterior commissure with lateral extension
- Covered by mucosa
- Rarely extends to trachea or true vocal cords

TREATMENT:

- Laser
- Steroids
- Tracheotomy

LARYNGEAL WEBS:

- Glottic web: most life threatening anomaly
- 98% anteriorly positioned
- Hoarseness
- Aphonia
- Stridor
- Airway obstruction

DIAGNOSIS:

- Flexible and/or rigid endoscopy

TREATMENT:

- Lysis:
  - Laser
  - Knife
- Tracheotomy
- Open procedure

LARYNGEAL CYSTS:

- Supraglottic region
- First few months of life
- Low cuboidal epithelium
- Arvepiglottic folds and epiglottic: most common location
- Presentation: Stridor and severe upper airway obstruction

DIAGNOSIS:

- Radiographically
- Endoscopy

TREATMENT:

- Endoscopy: Removal of cyst roof
- External approach with tracheotomy: in case of recurrence
- Aspiration is not sufficient

LARYNGOTRACHEOESOPHAGEAL CLEFTS

- Incomplete closure of cricoid
- Incomplete closure of tracheoesophageal septum

TYPES:

- Type I: Cricoid and interarytenoid muscle
- Type II: Six proximal tracheal rings
- Type III: Extension to carina

SYMPTOMS:

- Stridor and respiratory distress
- Feeding problems
- Repeated aspiration/pneumonia

ASSOCIATED FINDINGS:

- Polyhydramnios
- Prematurity
- Congenital defects

DIAGNOSIS:

- History
- Radiographic studies
- Endoscopy
- Awareness of the anomaly

CHOANAL ATRESIA

- A developmental failure of the posterior nasal cavity to communicate with the nasopharynx
- Etiology: Persistence of nasobuccal membrane
- Occurs in 1/5000 - 1/7000 live births
- Unilateral more than bilateral
- Bony vs. membranous (9:1)
- Associated abnormalities (20% - 50%) CHARGE
- Right: Left (2:1)
- Females:Males (2:1)

DIAGNOSIS:

- Clinical presentation/history
- Physical Examination
- Radiographic studies

MANAGMENT:

- Medical: Temporary/Early
- Surgical: Definitive

MEDICAL MANAGMENT:

- Secure airway
- Adequate feeding and care

SURGICAL MANAGMENT:

- Challenging
- No one type of repair can be used in every case with complete success and no complications

TYPES:

- Transnasal (dilation, drillout, curettage, laser, endoscopic)
- Transpalatal
- Trans septal
- Transantral
- Sublabial

SURGICAL REPAIR

TRANSPALATAL

- Better visualization
- Preservation of nasal lining
- Shorter stenting period
- Higher success rate
- Older children
- Developmental effects

TRANSNASAL

- Limited visualization
- Lower success rate
- Younger children
- Quick
- Minimal blood loss

CONCLUSION

STRIDOR:

- Anomalous Airway
- "Baby's cry for help"
- Warrants immediate attention

MANAGEMENT OF ANOMALOUS AIRWAY

- Plan of action
- Orderly and Focused
  - Where
  - What
  - Severity
  - Alternate airway

LARYNGEAL MANIPULATION = EDEMA = OBSTRUCTION

TEAMWORK + ACCURATE DX + ADEQUATE RX

EQUALS

SUCCESS