
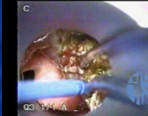



## Pediatric Obstructive Sleep Apnea – Beyond Adenotonsillectomy

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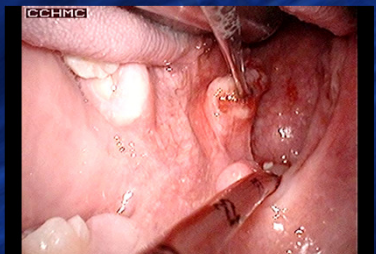
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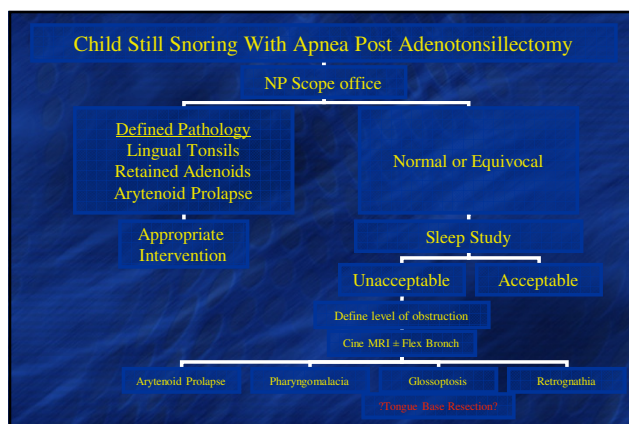
## Adenotonsillectomy effectively “cures” > 95% of children with snoring and sleep apnea



But what do you do with the remainder?

## Levels of Obstruction

- Nasal
  - Septum, turbinates
- Nasopharyngeal
  - Adenoid tissue
- Oropharyngeal
  - Pharyngomalacia
  - Lingual tonsils
  - Glossoptosis
- Laryngeal
  - Arytenoid prolapse / laryngomalacia



## Symptoms Do Not Necessitate Intervention

- Snoring is not a problem to the child
  - But may be to the parents
- However apnea is!
- Awake flexible laryngoscopy may reveal level of obstruction, but if it does not, sleep study

**Therefore, while a sleep study prior to adenotonsillectomy is rarely needed, it is recommended for children with symptoms following adenotonsillectomy**

## Awake Flexible Laryngoscopy

- Advantages – shows anatomical static pathology well
  - Adenoids, lingual tonsils
  - If pathology is found, do not investigate further, just treat
- Disadvantages – child is awake (with excellent tone!) therefore dynamic collapse pathology is not easily diagnosed

## If Normal Awake Flexible Laryngoscopy

- Options:
  - Treat
  - Investigate then treat
- Treatment without a diagnosis:
  - CPAP
  - Weight loss
  - Tracheotomy

## Personal Observations

- Most children with OSA following T and A have a defined level of obstruction
- Children do not tolerate CPAP well
- Transnasal flexible laryngoscopy defines pathology in a minority
- Obstruction is usually dynamic
- Beware – often more than 1 level of obstruction
- Glossoptosis > lingual tonsils > arytenoid prolapse > pharyngomalacia

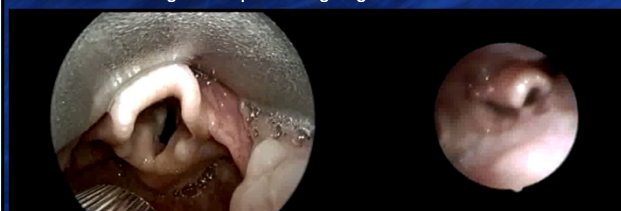
## Investigations

- Sleep study
  - Defines severity
- Cine MRI
  - Defines pharyngeal level of pathology
  - But not severity
- Rigid bronchoscopy
  - Poor for dynamic pathology
- Flexible transnasal laryngoscopy (light GA)
  - Light anesthetic essential



## Rigid vs Flexible Laryngoscopy

- Rigid endoscopy of limited value
- Flexible laryngoscopy (like sleep MRI) is more useful to determine level of obstruction
  - But is not good at quantitating degree of obstruction



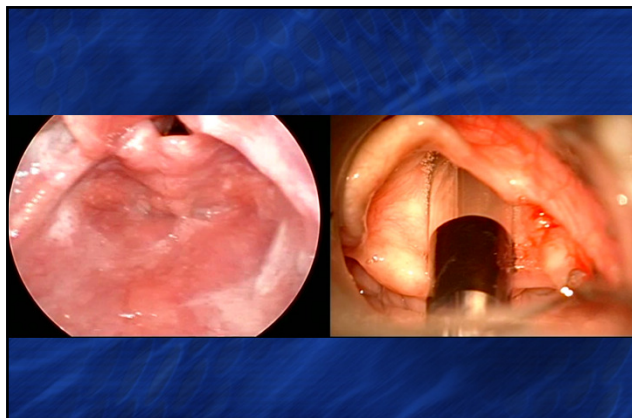
## OSA - Most Pediatric Pathology has a Surgical Solution

- Exception – pharyngomalacia
  - Tonsillectomy
    - If not already done
  - Weight loss
  - CPAP
  - Tracheotomy

## Interventions


- Lingual tonsil hypertrophy
  - Coblation >> electrocautery / CO2 laser / shaver
- Arytenoid prolapse
  - Endoscopic partial arytenoidectomy
- Glossoptosis
  - Controversial





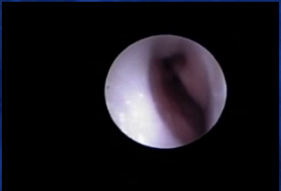
### Customize Intervention

- Hunter's syndrome
  - Past tonsillectomy
  - Past adenoidectomy x 2
- Increasing OSA
- Where is the obstruction




### Flexible May Compliment Rigid

- Flexible "sleep" endoscopy
- In this case:
  - Recurrent adenoids
  - Lingual tonsils
  - Arytenoid prolapse
  - Pharyngomalacia
- First 3 can be surgically corrected



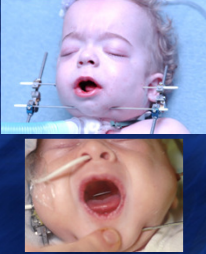
### Glossoptosis

- Retrognathia
- Macroglossia
  - Down syndrome
  - Beckwith Weiderman
- Relative macroglossia
  - Usually seen with obesity
  - May be seen with a small pharynx
  - May be associated with poor neuromuscular control

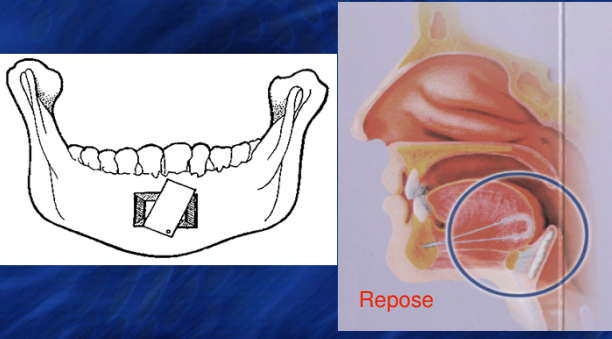


### The Child with a Prominent Tongue Base

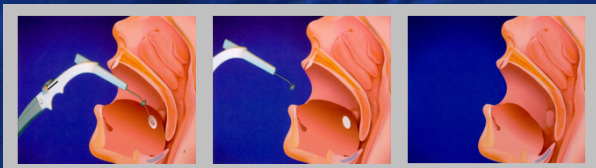
- If retrognathic, consider mandibular advancement
- If not:
  - CPAP
  - Tracheotomy
  - Anterior tongue wedge resection
  - Geniohyoid sling
  - Glenoid tubercle advancement
  - Transglossal suture
  - Mandibular periosteal advancement
  - Somnus / coblator to tongue base
  - **PARTIAL RESECTION OF THE TONGUE BASE**



### Genioglossus Advancement



### Radiofrequency Reduction of Base of Tongue



- Insert electrode
- Deliver energy
- Creation of submucosal coagulative lesion
- Tissue is heated-limited area
- Mucosa protected
- One or more procedures with a # of lesions created
- Lesions are resorbed in 3 to 8 weeks
- Reduction in tissue volume

Photos courtesy of Somnus Medical Technologies, Inc., Sunnyvale, CA.

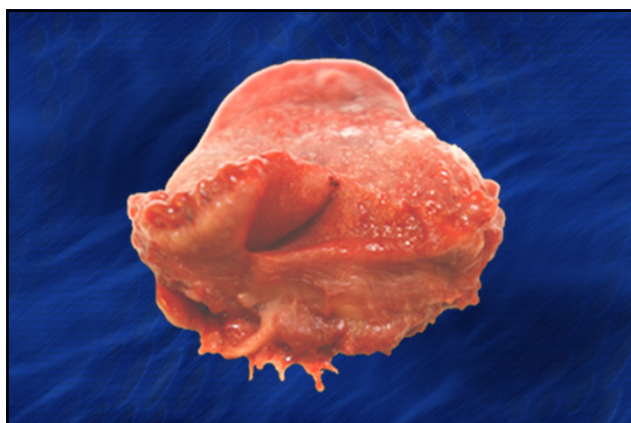
### Endoscopic Tongue Base Resection - Evolution

- Lingual thyroglossal duct cyst management
- Endoscopic resection is essentially an endoscopic resection of the tongue base



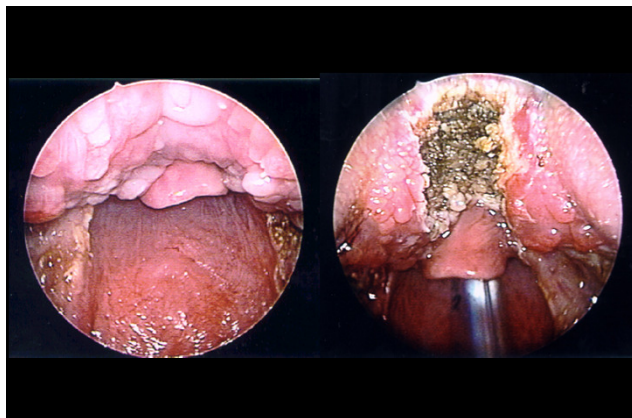
### LTGDC – Endoscopic Excision

- Technique:
  - Nasal intubation
  - Suspend patient on Lindholm laryngoscope
  - Operating microscope
  - Long (6 inch) guarded needle point Bovey
  - Cup forceps and suction
  - Check patient is easy to re-intubate at conclusion
  - Intubated overnight



### Case 1

- 12 year old boy, past adenotonsillectomy
- Tourette's syndrome, otherwise well
- Sleep study
  - 43 obstructive apneas
  - 135 obstructive hyponeas
  - Obstructive Index 47
- Endoscopic tongue base resection



### Case 1


- Post-op sleep study
  - Minimal obstruction
  - Obstructive Index 0.2 (cf 47 pre-op)

### Case 2

- 16 year old girl
  - Cerebral palsy, past LTR, decannulated
  - Past adenotonsillectomy
  - Increasing snoring at night
  - Abnormal sleep study
- Somnus x 2 – small improvement, but tongue abscess

### Case 2

- Repeat sleep study – worsening
- Cine MRI – severe glossoptosis
- Tongue base resection (temporary tracheotomy)




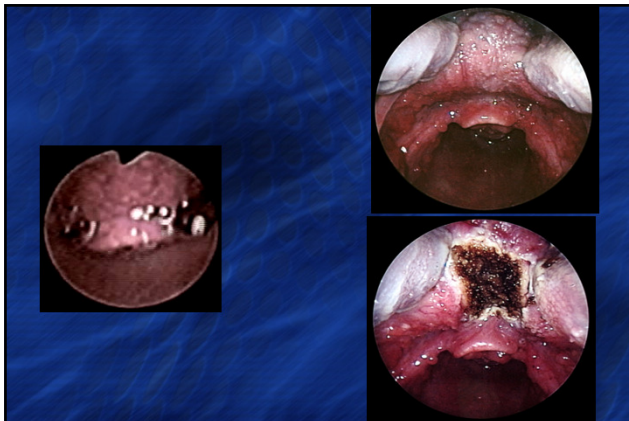
### Case 2

	RDI	OI
July 00	1.1	0.2
March 01	8.7	6.4
<i>Somnus x 2</i>		
Nov 01	23.3	12.7
<i>Tongue base resection</i>		
July 02	1.6	0.4

### Case 3


- 8 year old boy
  - Ex 26 week preemie, failed LTR
- Initial assessment
  - Glossoptosis
  - Grade 3 SGS
  - Papillomatosis





### Case 3

- Tongue base resection
- Cricotracheal resection
- Decannulation




### Limitations of Endoscopic Partial Tongue Base Resection

- Not a substitute for mandibular distraction if retrognathic
- Requires care to avoid damaging the epiglottis
- Post-operative pain slightly worse than tonsillectomy

### Conclusion

- Awake NP scope, asleep flexible bronchoscopy, sleep study and cine MRI may all be complementary
  - What you see on flex scope under GA may not be representative of the child's true abilities
- When possible, surgery is preferable to CPAP
- Endoscopic tongue base resection is comparatively simple and effective



Find it and fix it

