Sleep disordered breathing in children

Royal Victorian Eye and Ear Hospital

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19 October 2023

Plan for this seminar

- Definitions
- Pathophysiology and Epidemiology
- Effects of OSA
- Natural history
- Clinical evaluations
- Possible investigations
- Possible treatments
- Perioperative problems
- Long-term concerns of surgery
- Management plan
- Behavioural sleep problems
- Resources and references

Snoring – 27% of children

- Snoring is the noise made during sleep from airflow-induced flutter of soft tissues of the nasopharynx
- Part of this is the muscular relaxation in sleep
- More likely to occur if:
  - **Large tonsils and adenoids** (major component for most children)
    - Tonsils and adenoids grow most quickly in the pre-school years
    - Adenoids are large in some children before 12 months

Sleep disordered breathing

A **spectrum** of sleep disorders

Each has similar upper airway obstructive pathophysiology but differs in:

.degree, and

.clinical consequences of the airway obstruction

Includes:

- **Primary snoring** (isolated snoring without obstructive apnoea, arousals, or gas exchange abnormalities) [approx. 10% of children]
- **Upper airway resistance syndrome** (UARS)
- **Obstructive sleep apnoea** (OSA) [approx. 5% of children].

https://doi.org/10.5664/jcsm.27022

https://www.atsjournals.org/doi/full/10.1164/rccm.200912-1930OC

https://www.sleepfoundation.org/snoring/snoring-children#:~:text=Primary%20snoring%20without%20other%20symptoms,a%20diagnosis%20of%20primary%20snoring

Primary snoring (in 70% with snoring)

- Snoring that is **not** accompanied by awakening or excessive arousals, limitation of airflow, oxygen desaturation, hypercapnia or arrhythmias during sleep
- Do **not** have daytime symptoms.

https://www.msdmanuals.com/en-au/professional/neurologic-disorders/sleep-and-wakefulness-disorders/snoring#:~:text=Primary%20snoring%20is%20snoring%20that,not%20have%20excessive%20daytime%20sleepiness

Upper airway resistance syndrome

- Airflow limitation secondary to increased upper airway resistance
- Does not meet the full criteria for obstructive sleep apnoea
  - Can cause excessive daytime symptoms or other manifestations suggesting obstructive sleep apnoea

But …

There are neurocognitive and behavioural concerns for some children, and studies indicate that there is clinical benefit for these children having tonsillectomy and adenoidectomy surgery.

https://www.atsjournals.org/doi/full/10.1164/rccm.200912-1930OC

https://www.msdmanuals.com/en-au/professional/neurologic-disorders/sleep-and-wakefulness-disorders/snoring#:~:text=Primary%20snoring%20is%20snoring%20that,not%20have%20excessive%20daytime%20sleepiness

Obstructive sleep apnoea - OSA (5%)

- Repetitive episodes of upper airway obstruction during sleep
- Leads to hypoxia and/or sleep disturbance, with possible hypercapnia and arrhythmias
- Important implications for:
  - Learning
  - Behaviour and cognition
  - Cardiovascular health.

Nixon GM, Davey M; Sleep apnoea in the child. *Australian Family Physician*, 44(6):352-355

Pathophysiology and Epidemiology of OSA

Peak age is 2-8 years old
- Large tonsils and adenoids
- Small midface

Early onset:
- Prematurity
- Trisomy 21
- Day care attendance
- African

Increased risk:
- Tobacco exposure
- Obesity

Boys = girls pre-puberty, but
Boys > girls post-puberty

https://www.ncbi.nlm.nih.gov/books/NBK557610/

Tonsil and adenoid hyperplasia

- Influenced by a variety of opportunistic, commensal, and pathogenic **microorganisms**, as well as the **immune response** to them

- Children with tonsil hypertrophy receive greater amounts of daily calories overall from sugar products, soft drinks and edible fats

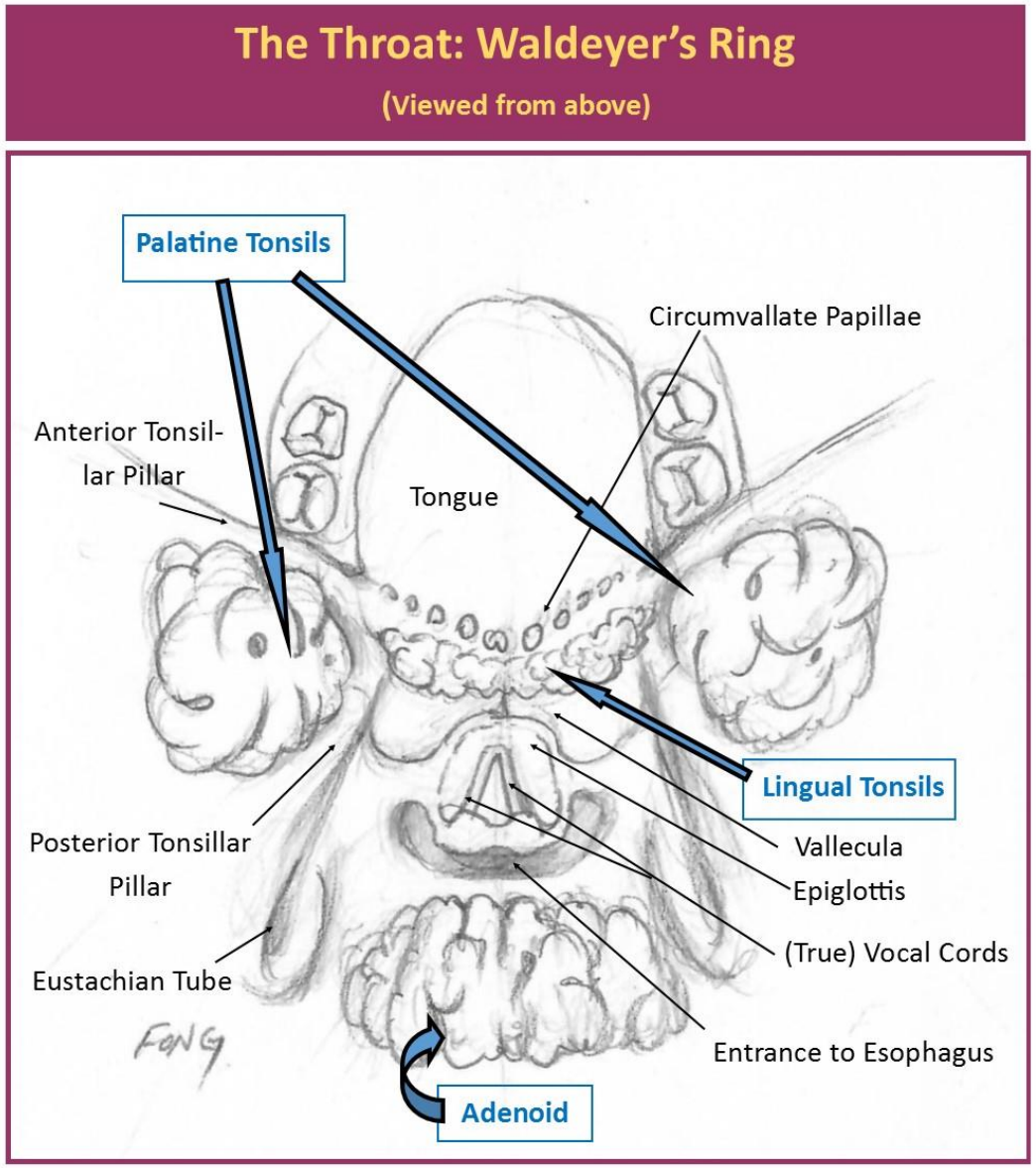
European Review for Medical and Pharmacological Sciences 2010; 14: 1025-1030

https://doi.org/10.1111/j.1365-2273.1993.tb00824.x

MALT

Mucosa-associated lymphoid tissue in the throat

- Placed at the intersection between the respiratory and digestive systems
- Plays a role in defence against pathogens introduced through inhalation and digestion, serving as primary sites for:
  - antigen sampling
  - triggering immune responses



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10383913/#B89-microorganisms-11-01624

http://randallfong.blogspot.com/2017/08/sore-throat-102-waldeyers-ring-and.html

Three groups of children

1. Marked tonsil and adenoid hypertrophy without obesity
2. Obesity, often with milder upper airway lymphoid hyperplasia
   50% of obese children have OSA
3. Variety of craniofacial and neuromuscular disorders, e.g., Crouzon and Apert syndrome, Trisomy 21, cerebral palsy, muscular dystrophy

Often there is a **Combination** of anatomical and neuromotor factors

- i.e., there are structural abnormalities ***and*** a more collapsible airway

Effects of OSA

- Central nervous system
- Cardiovascular system
- Metabolism
- Somatic growth
- Quality of life

CNS

Neurocognitive and behavioural deficits

- Not present in all children
- Daytime hyperactivity and inattention is related to the sleep fragmentation
- Fatigue causes:
  - irritability and
  - impaired concentration
  - reduced interest in daily activities

- Uncertainty about whether the
  - **Duration** of the OSA
  - **Age** at which it develops

  modifies the severity

Cardiovascular

- Increases in blood pressure during obstructed sleep
  - Could lead to lifelong hypertension
- Structural changes - increased left and right ventricular wall thickness, evident on echocardiography
  - Increased intrathoracic pressure swings produces left ventricular hypertrophy
  - Intermittent hypoxia causes increased pulmonary artery pressure and right ventricular dysfunction

- There is evidence for the reversibility of these structural cardiac changes with resolution of the OSA
- Implication that there is benefit of early detection and treatment of OSA

Metabolic changes

Individual metabolic parameters:

- Insulin resistance with changes in fasting insulin
- Elevation of LDLs and cholesterol

Mainly associated with children with OSA who are also obese

Failure to thrive in 5% from:

- Increased energy used in breathing at night
- Difficulty swallowing because of a blocked nose and the size of the tonsils
- Reduced **Deep (stage 3)** sleep when Growth Hormone is secreted

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5734900/#:~:text=01)%2C%20reduced%20deep%20sleep%20efficiency,OSA%20compared%20with%20healthy%20controls.

Natural history of snoring

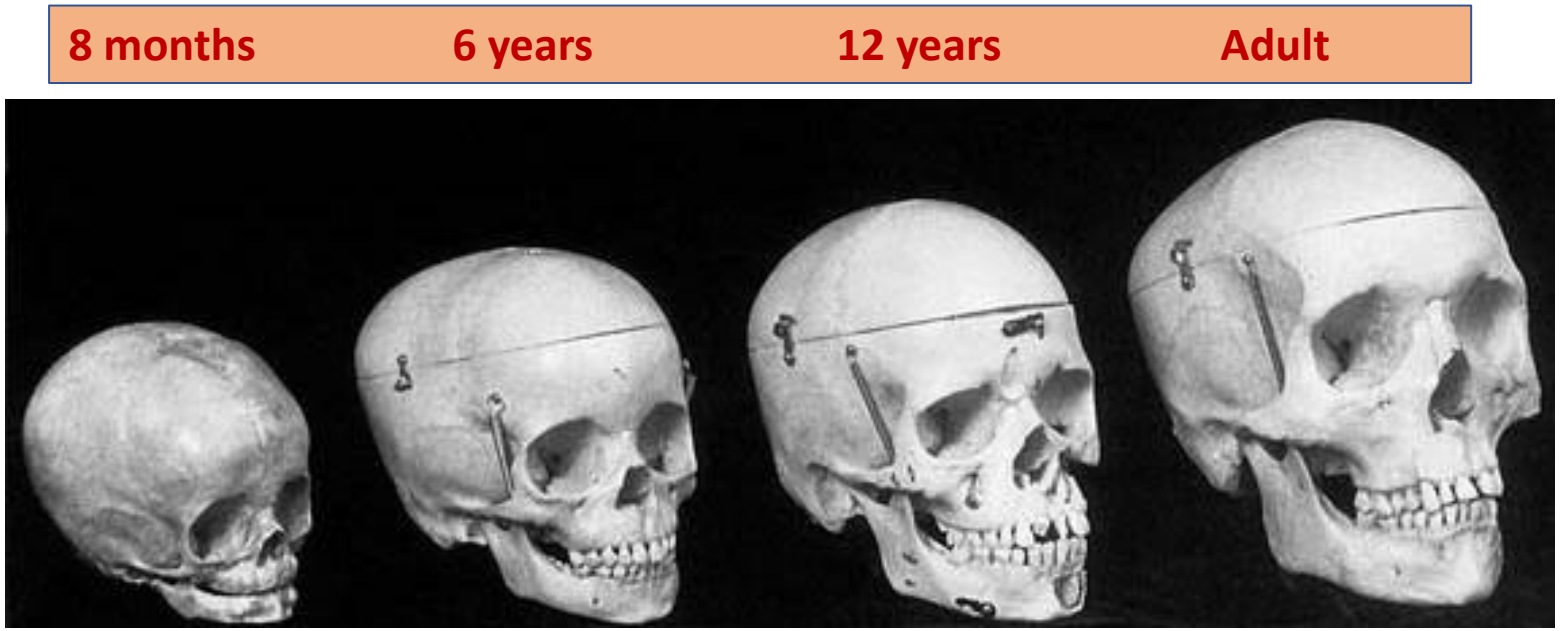
- Around 40% of snoring children continue to snore habitually as adolescents
- Male gender and higher BMI are significant risk factors

Facial growth

Slow growth to 8 years and then rapid growth including the nasopharyngeal and oropharyngeal spaces

Tonsil size

Reduction in the immunological function of the tonsils with age, and they reduce in size



https://onlinelibrary.wiley.com/doi/full/10.1111/jpc.12607?saml_referrer https://pubmed.ncbi.nlm.nih.gov/22939928/
DOI: 10.1136/adc.71.1.74

Clinical evaluation of the snoring child

- Not completely reliable for diagnosis but can be suggestive, and these findings are on a **continuum**
- Red flag findings clearly correlate with OSA
  - The more red flag findings a patient has and the more severe they are, the greater the likelihood of OSA.

https://www.msdmanuals.com/en-au/professional/neurologic-disorders/sleep-and-wakefulness-disorders/snoring#:~:text=Primary%20snoring%20is%20snoring%20that,not%20have%20excessive%20daytime%20sleepiness.

Snoring – possible OSA

Snoring or noisy breathing during sleep present ≥3 nights/week without a cold
Difficulty breathing while asleep (including increased effort of breathing, choking, gasping or snorting during sleep) observed by parents Restless and sweaty
Parents who report being afraid for their child's health because of the child's breathing while asleep
Frequent daytime mouth breathing and difficulty swallowing
Witnessed obstructive apnoea during sleep (parent describes cessation of airflow with clear ongoing breathing effort*)
*All children have central apnoea during sleep where there is cessation of airflow without respiratory effort, and care should be taken to distinguish this on history from obstructive apnoea if possible

Nixon GM, Davey M; Sleep apnoea in the child. *Australian Family Physician*, 44(6):352-355

https://jcsm.aasm.org/doi/10.5664/jcsm.3374

- Sleeps in unusual positions, e.g., propped up high on pillows or on the side of the cot
- Secondary enuresis (after being dry for 6 months)

OSA-5 score – 5-question instrument

The 5-question instrument (OSA-5) developed during the study and tested for prediction of OSA in the prospective validation phase of the project.

	During the past 4 weeks, how often has your child had …	None of the time	Some of the time	Most of the time	All of the time
1	Loud snoring?	0	1	2	3
2	Breath holding spells or pauses in breathing at night?	0	1	2	3
3	Choking or made gasping sounds while asleep?	0	1	2	3
4	Mouth breathing because of a blocked nose?	0	1	2	3
* 5	Breathing problems during sleep that made you worried that they were not getting enough air?	0	1	2	3

Not OSA <5
Likely OSA >7

Soh HJ, Rowe K, Davey MJ, Horne RSC, Nixon GM. *International Journal of Pediatric Otolaryngology* 113 (2018) 62–66. The OSA-5: Development and validation of a brief questionnaire screening tool for obstructive sleep apnea in children

OSA - Differences between adults and children

Adults	Children
Alternating snoring with obstructive apnoeas	Continuous snoring – episodic reduction in flow (hypopnoea) without obstructive apnoea is most common
Daytime sleepiness is a cardinal feature	Daytime sleepiness is uncommon
Obesity is common	Most children are normal weight, although failure to thrive may occur in severe cases and obesity increases the risk of OSA
Male predominance	No prevalence difference by gender

Nixon GM, Davey M; Sleep apnoea in the child. *Australian Family Physician*, 44(6):352-355

Differences in symptoms for children who are obese

Type I – normal/low weight

Type II - obese

Overlaps with Attention Deficit Hyperactivity Disorder (ADHD)

	Type I	Type II
* Excessive daytime sleepiness	+	++++
Weight gain	–	++
* Hyperactive behavior	++++	– or +
Truncal obesity	– or +	+++
Enlarged neck circumference	– or +	+++
Enlarged tonsils or adenoids	++++	++
Depression and low self-esteem	+	+++
Shyness and social withdrawal	+	+++
* Left ventricular hypertrophy	++	++++
* Systemic hypertension	+	++++
Recurrent ear infections	+++	– or +
Insulin resistance	–	++++
Dyslipidemia	+	++++
Elevated C-reactive protein	++	++++
Elevated liver enzymes	–	++

https://www.clinicalkey.com.au/service/content/pdf/watermarked/1-s2.0-S1556407X07000537.pdf?locale=en_AU&searchIndex=

Clinical examination

Growth: either slowing of weight gain or obesity
Craniofacial structure (retro/micrognathia, midface hypoplasia, adenoidal facies)
Nasal airflow, septum, turbinates
Tongue, pharynx, palate, uvula, tonsils
Pectus excavatum or Harrison's sulci
Right ventricular hypertrophy, pulmonary hypertension, systemic hypertension *

Nixon GM, Davey M; Sleep apnoea in the child. *Australian Family Physician*, 44(6):352-355

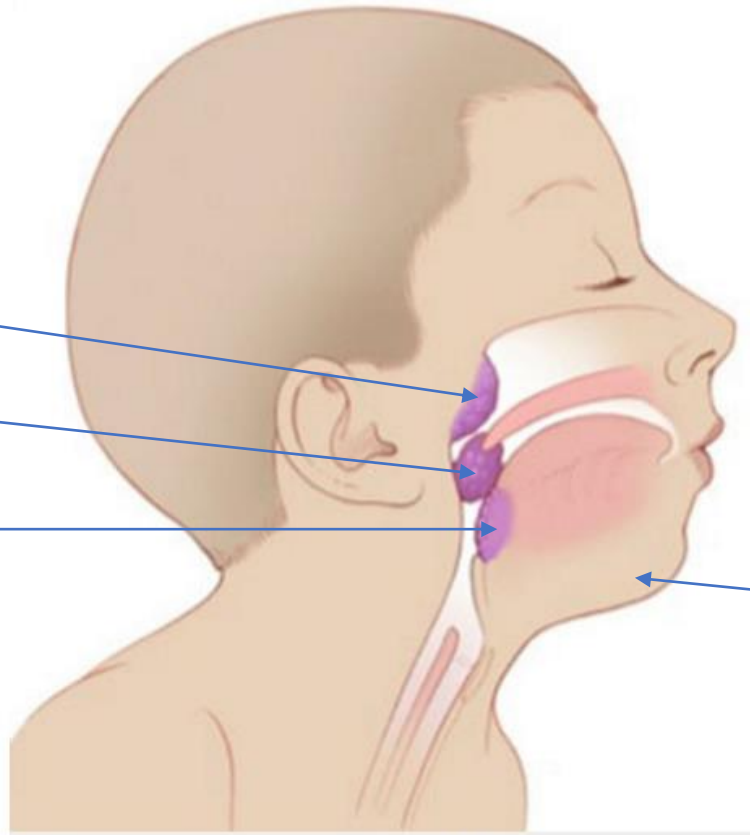
Examination

Obstruction at multiple levels …

Adenoids

Tonsils

Lingual tonsils



Side view showing where adenoids lay in the back of the nose (nasopharynx). Adenoids are made of the same type of tissue, called lymphoid tissue, as the tonsils in the throat. This tissue can also be found in the back of the tongue, called lingual tonsil.

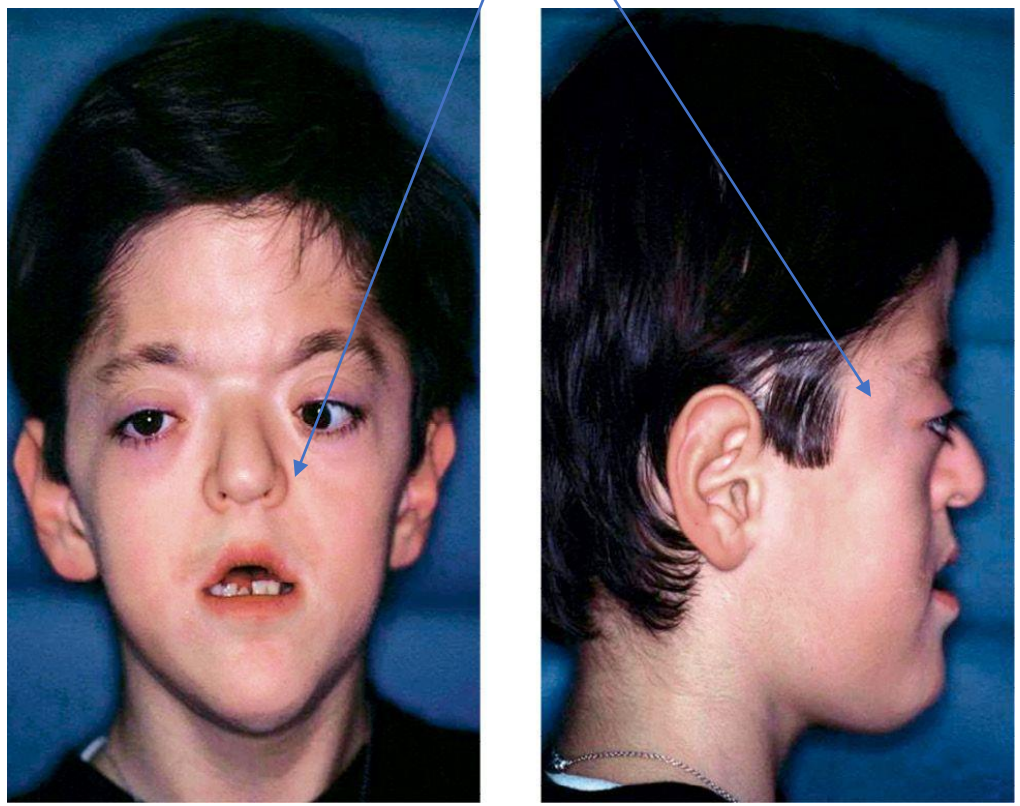
Child sleeps with neck extended

Smallish jaw

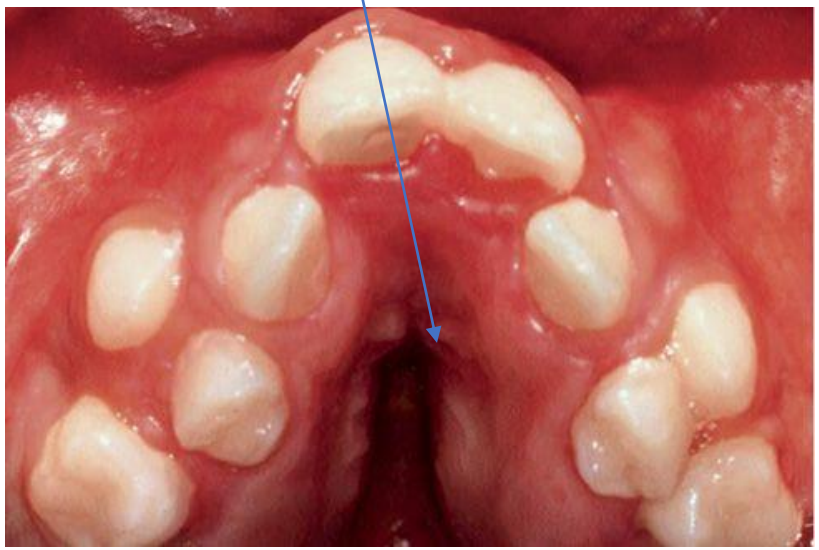
http://www.stanfordchildrens.org/en/service/ear-nose-throat/conditions/chronic-rhinorrhea

Craniofacial syndromes - Apert syndrome

Flat facies, shallow orbits

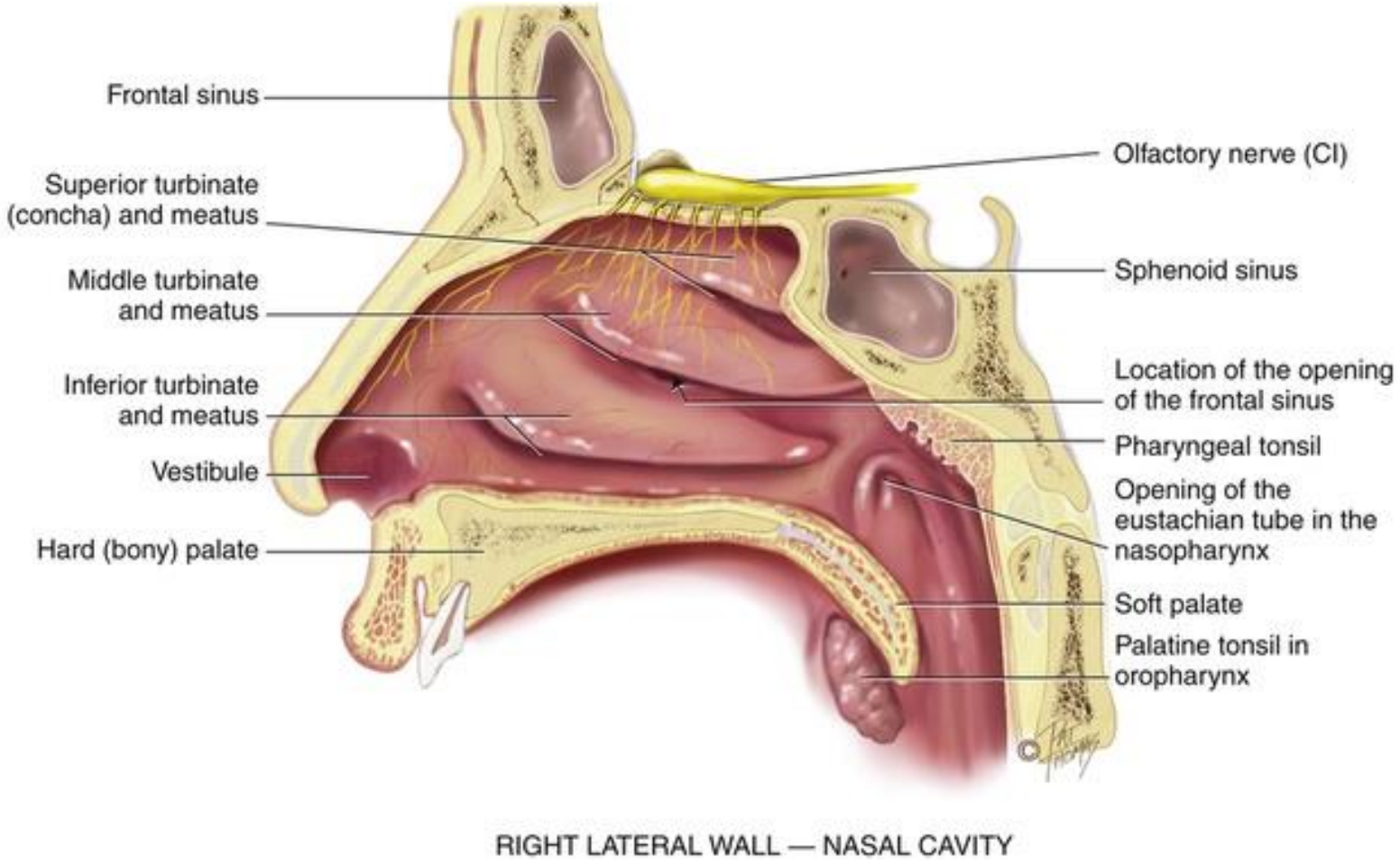


Narrow palate



http://pocketdentistry.com/orthodontic-treatment-of-craniofacial-synostosis/

The Nose

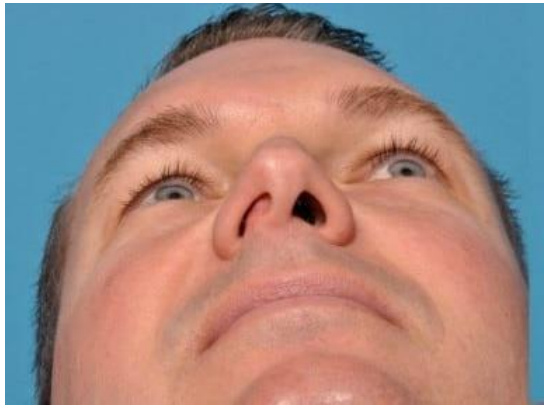


RIGHT LATERAL WALL — NASAL CAVITY

https://musculoskeletalkey.com/ear-nose-throat-and-mouth/

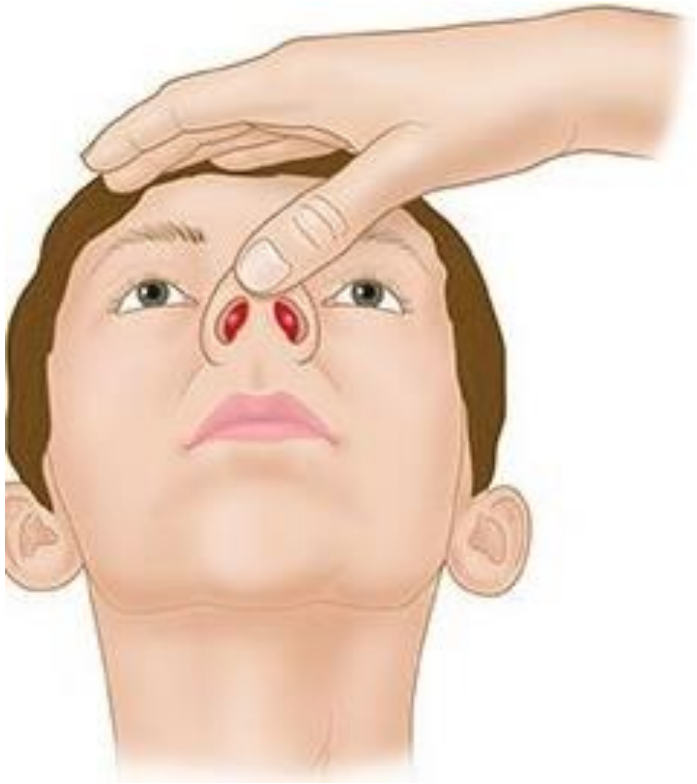
Nasal examination

From below



https://www.pacificheadandneck.com/nose-sinus/deviated-septum-septoplasty/

With a thumb

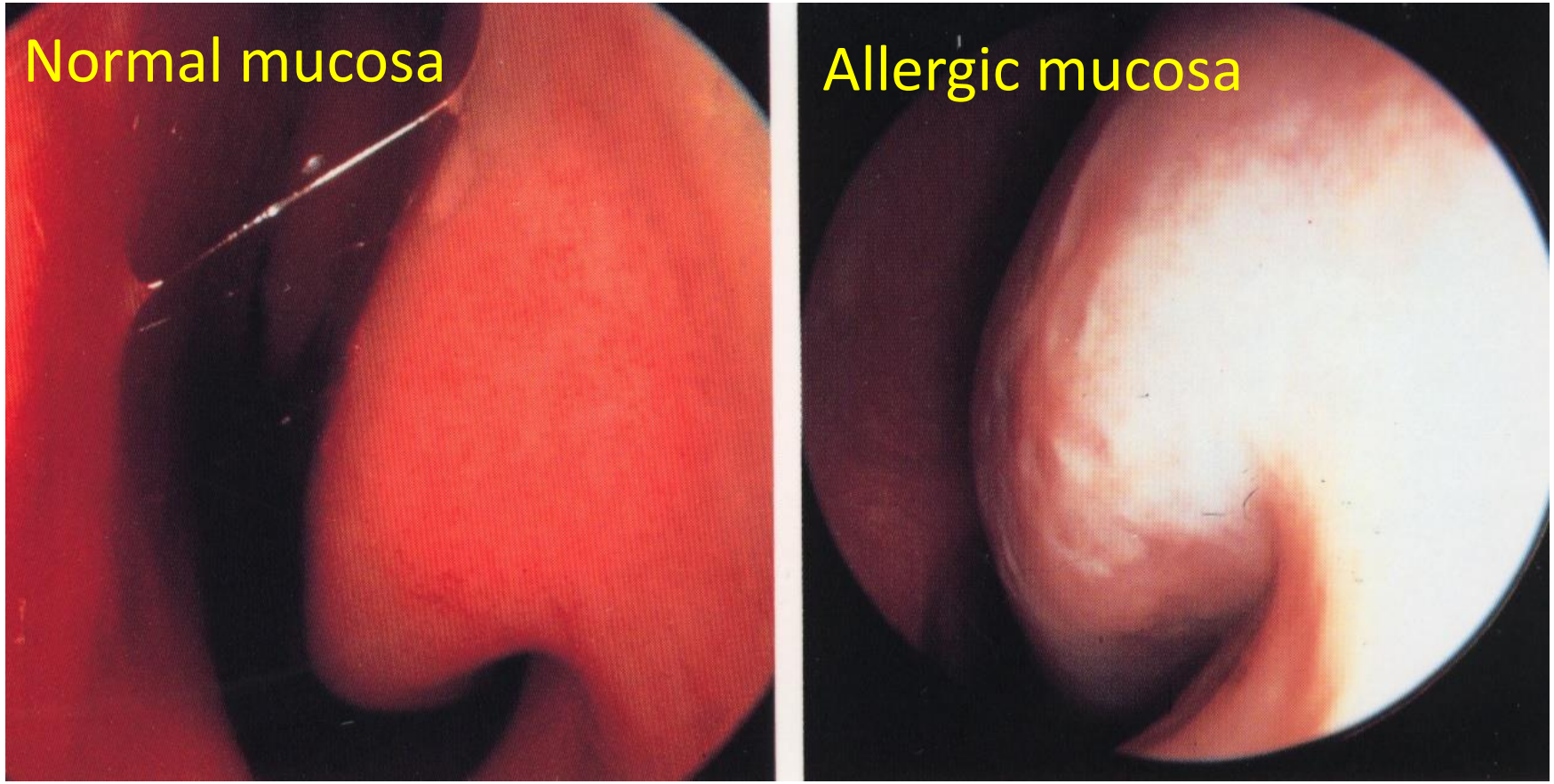


https://www.drugs.com/cg/nasal-fracture-in-children.html

With an otoscope

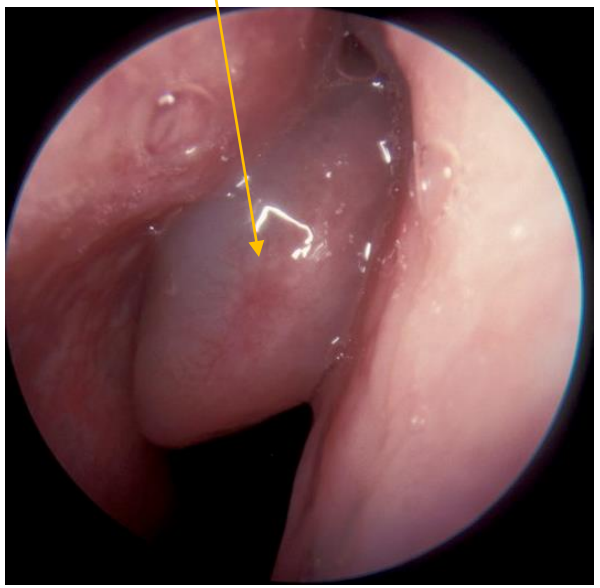
https://www.medicalnewstoday.com/articles/322686

Nasal mucosa



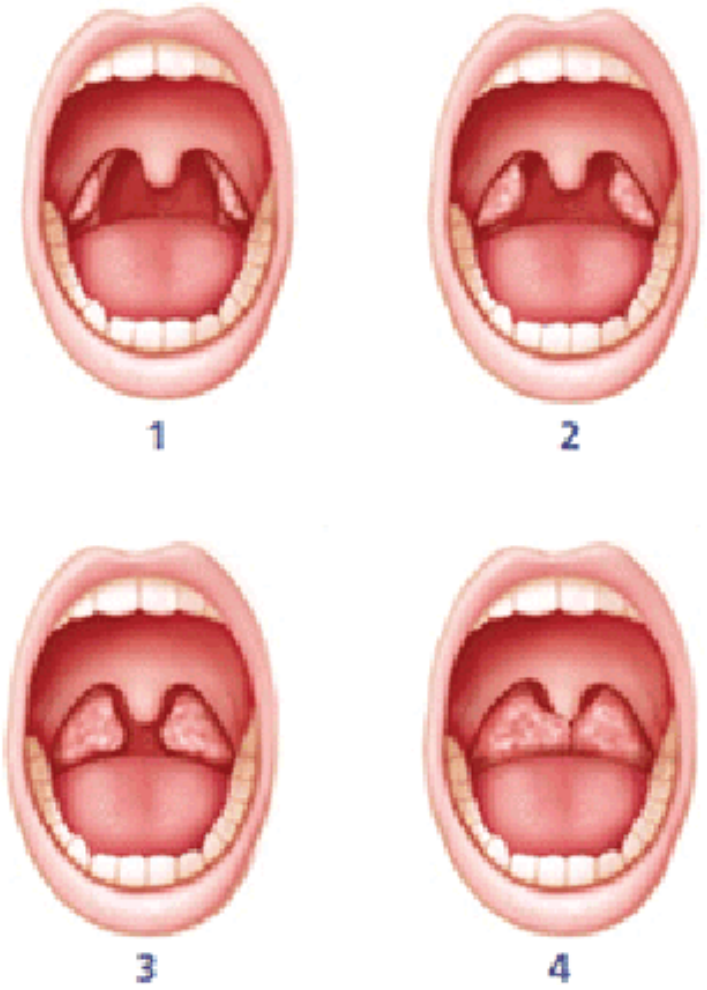
Not to be confused with …

Nasal polyp



Bull P & Clarke R. *Diseases of the Ear, Nose and Throat*. Blackwell Publishing 2007.

The Brodsky scale of tonsil size



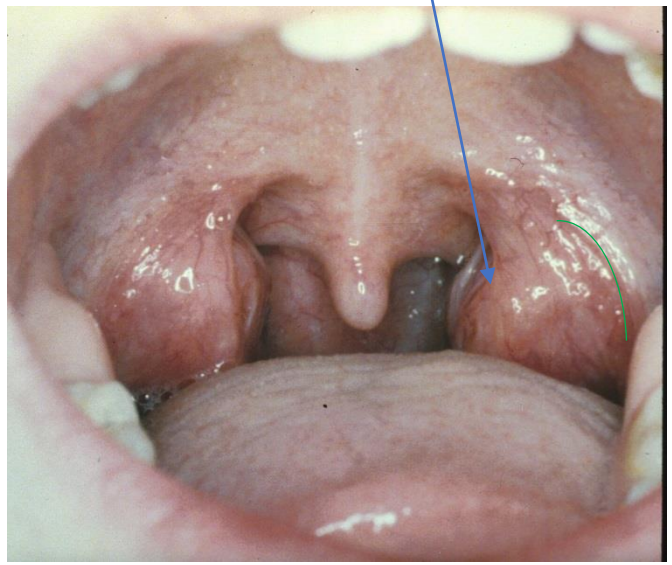
Brodsky Table

(Degree of Tonsils Blockage)	Ratio of the Tonsil in the Oropharynx
Degree 1	Tonsil occupies less than 25% of the Oropharynx
Degree 2	Tonsil occupies from 25 to 50% of the Oropharynx
Degree 3	Tonsil occupies from 50 to 75% of the Oropharynx
Degree 4	Tonsil occupies more than 75% of the Oropharynx

Figure 2. *The Brodsky scale for clinical tor grading in children*[68].

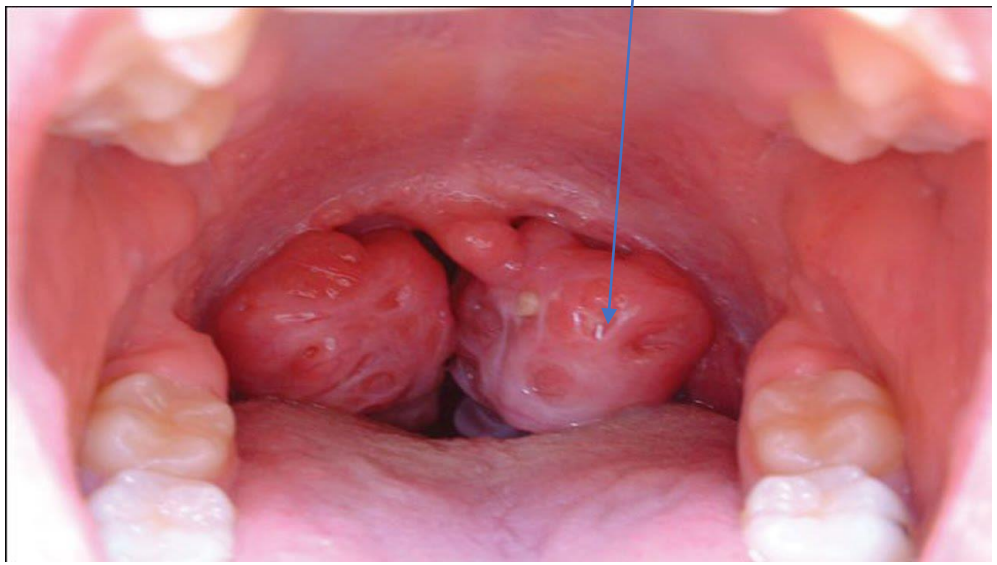
https://www.semanticscholar.org/paper/Pediatric-obstructive-sleep-apnea-evaluation-of-and-Borgstr%C3%B6m/398a15d332338b385e5230824819a37055b39650

Endophytic ‘Innies’



https://www.bajaj.org.uk/services/tonsillectomy-adults

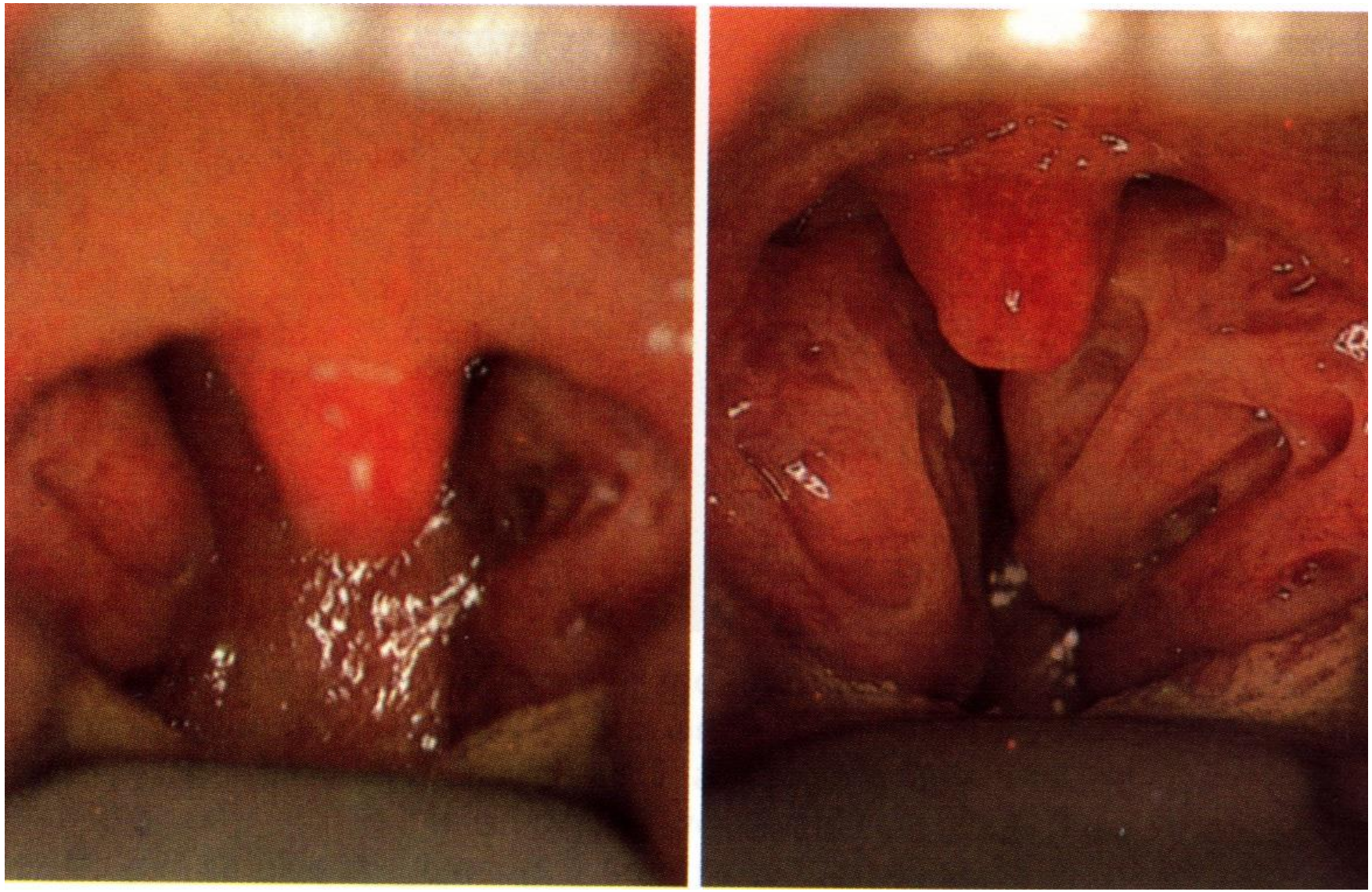
Exophytic ‘Outies’



http://www.newhealthadvisor.com/is-tonsillitis-contagious.html

Examination – tongue depressor

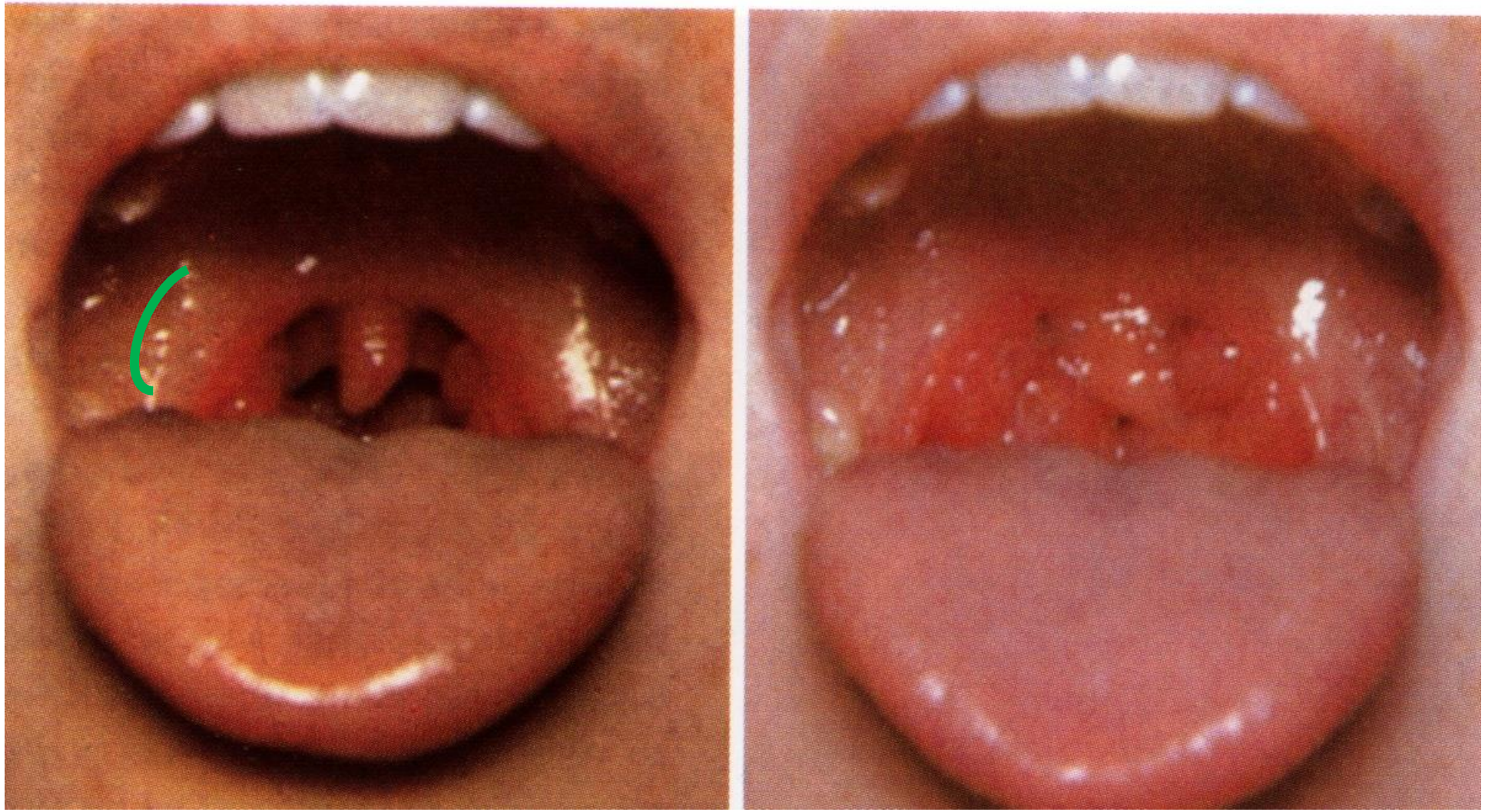
Large tonsils may look larger when the tongue depressor is used and the patient gags



https://www.mussenhealth.us/hearing-loss/snoring.html

Tonsil size – same person protruding tongue

The actual size of the tonsil is more apparent



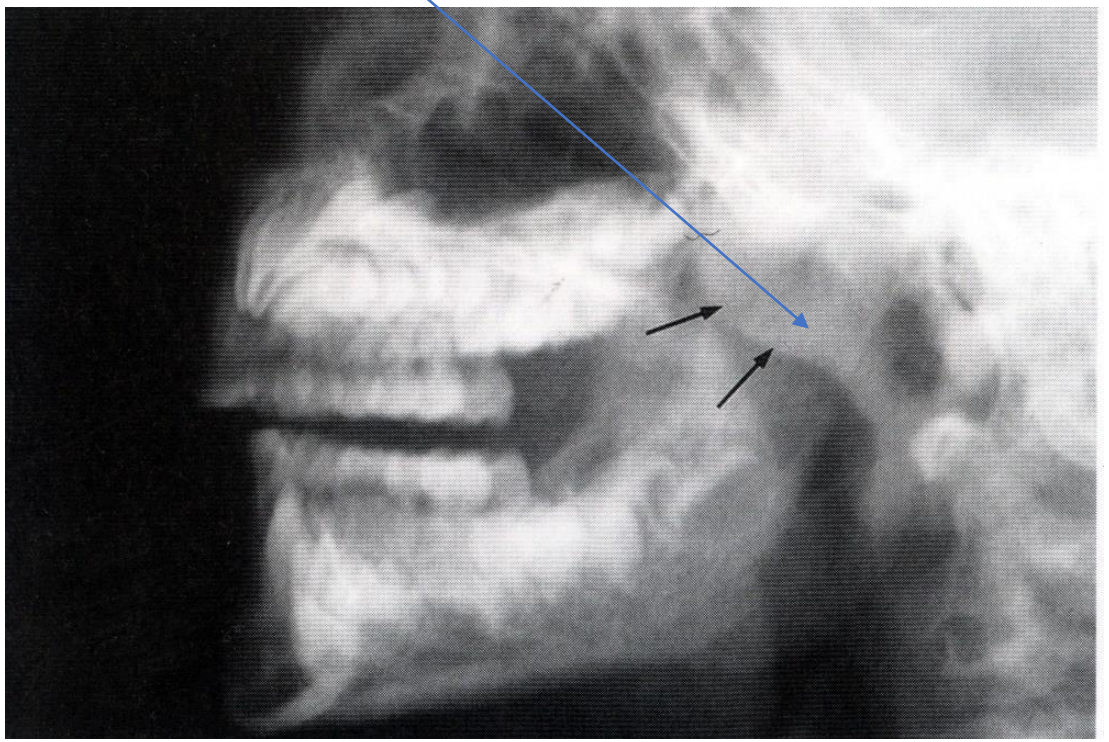
https://www.mussenhealth.us/hearing-loss/snoring.html

Adenoids

Endoscopic view through the nose

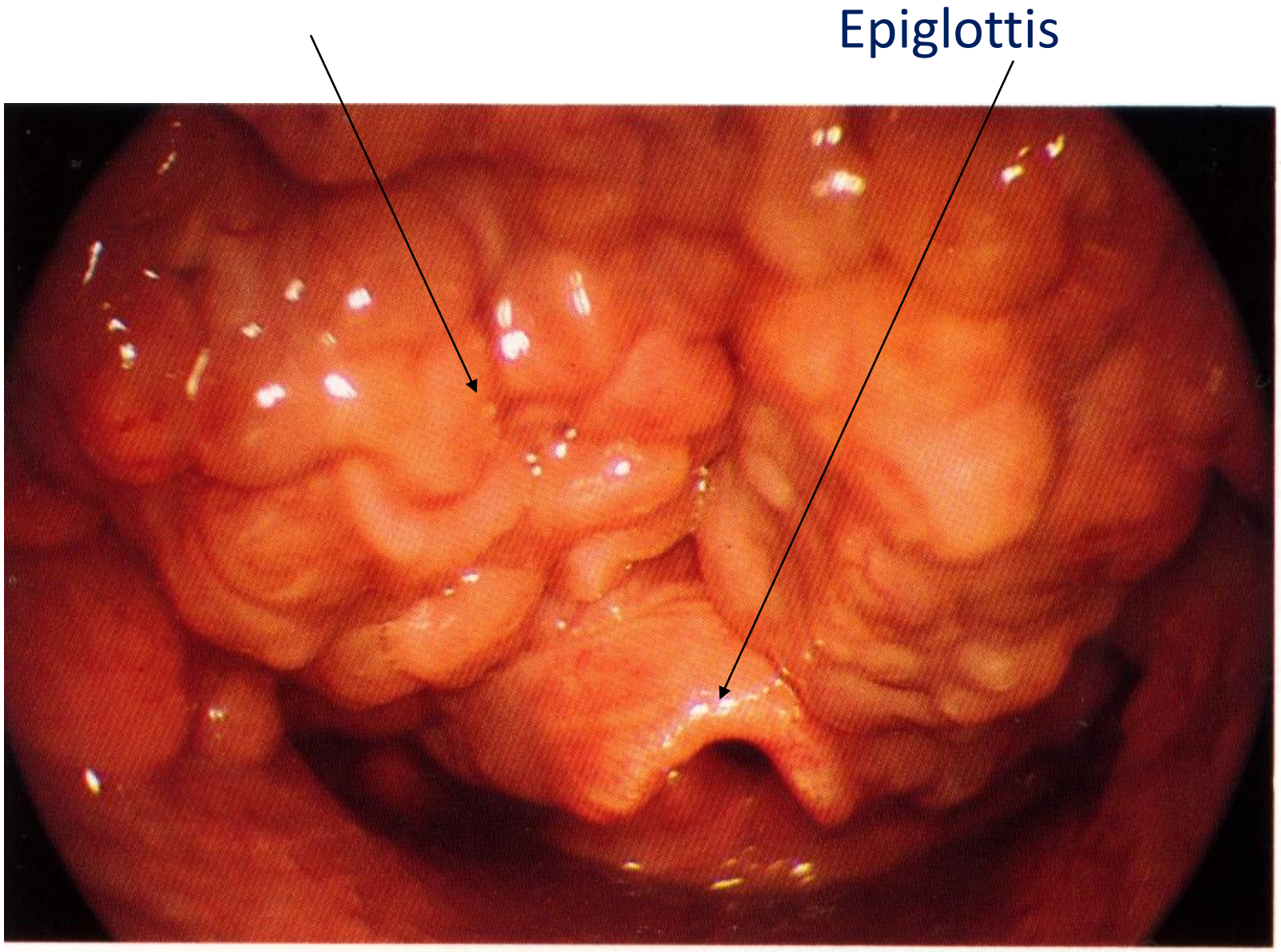
Beker W et al. *Atlas of Ear, Nose and Throat Diseases*, 1984, Thieme.

Plain view of the nasopharynx



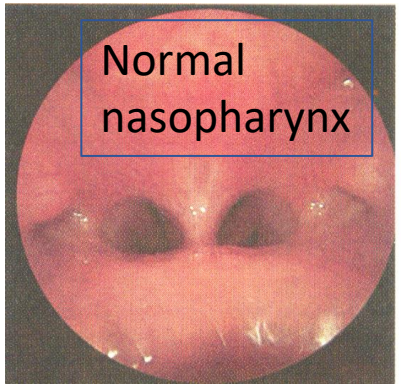
Bull P & Clarke R. *Diseases of the Ear, Nose and Throat*. Blackwell Publishing 2007.

Lingual tonsils

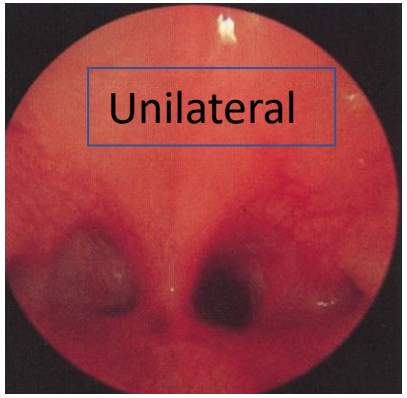


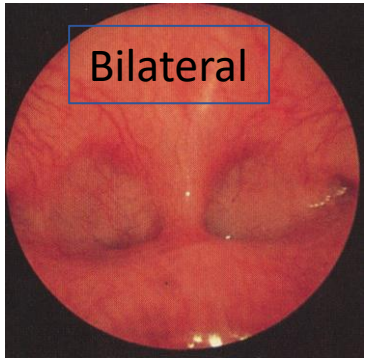
Nasal obstruction – congenital problems

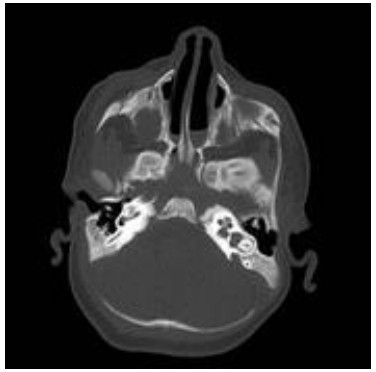
Choanal atresia



http://radiopaedia.org/articles/choanal-atresia







Usually present in the newborn period, but if unilateral choanal atresia this may be later

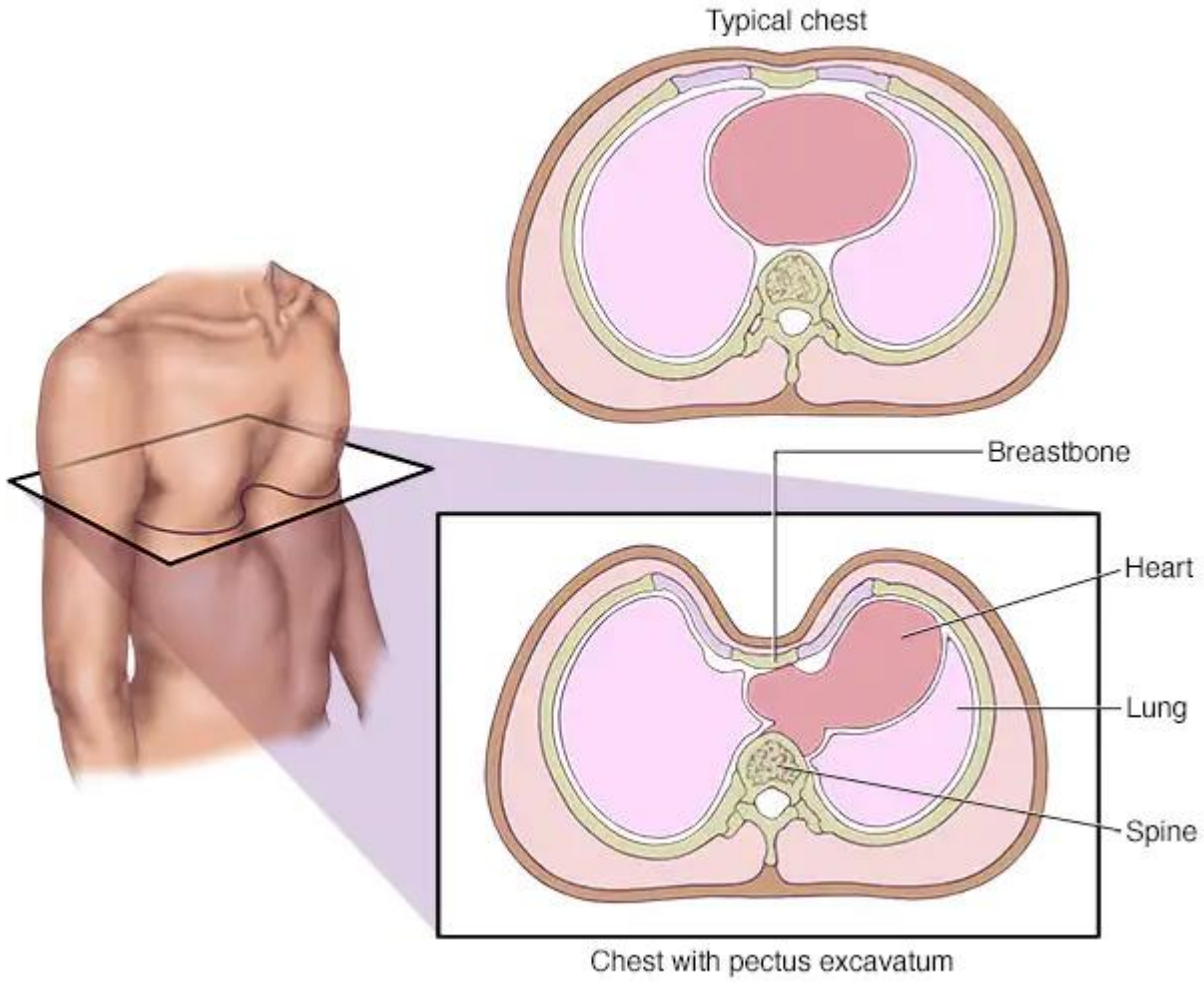
Pyriform aperture stenosis

https://www.google.com.au/search?q=pyriform+aperture+stenosis&espv=2&biw=1920&bih=955&source=lnms&tbm=isch&sa=X&ved=0ahUKEwj8ku6e55bMAhVIJaYKHcOeBA4Q_AUIBigB#imgrc=AiOqodQ5MIFNOM%3A

http://www.hindawi.com/journals/bmri/2014/125810/tab1/

- 5F catheter cannot pass
- 8-10 mm or less on CT scan

Pectus excavatum = Harrison's groove or sulcus



- Pectus excavatum is a condition in which the person's breastbone is sunken into the chest.

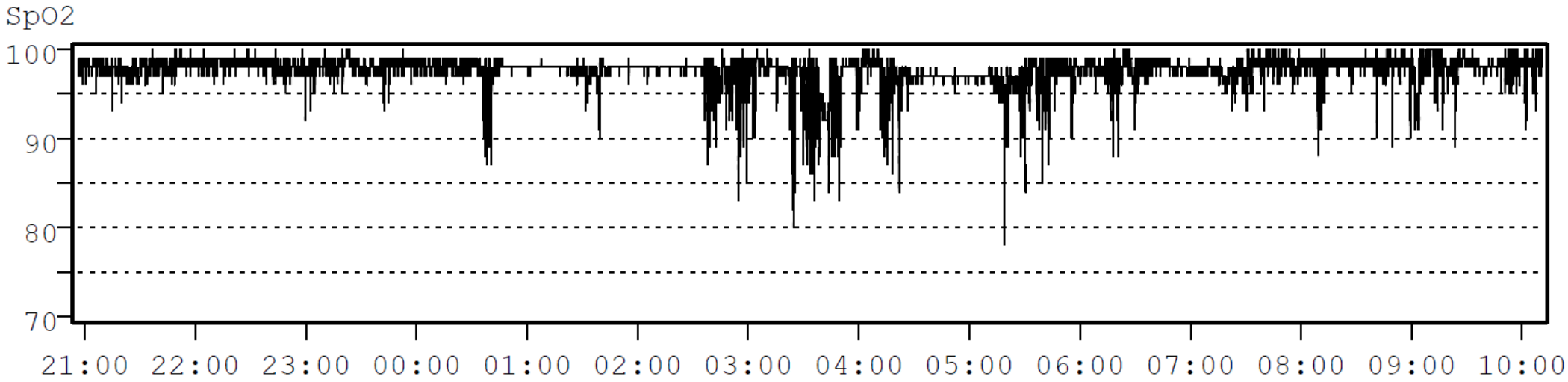
https://www.mayoclinic.org/diseases-conditions/pectus-excavatum/symptoms-causes/syc-20355483#dialogId15784251

Possible investigations for OSA

- Home oximetry
- Polysomnography
- Home video

Overnight oximetry
(Readily available, performed in the child's home)

- Only useful if there is hypoxia
- Does not measure sleep fragmentation



Polysomnography – usually overnight in a sleep laboratory

http://www.sleepwebmd.com/sleep-disorders-in-children.html

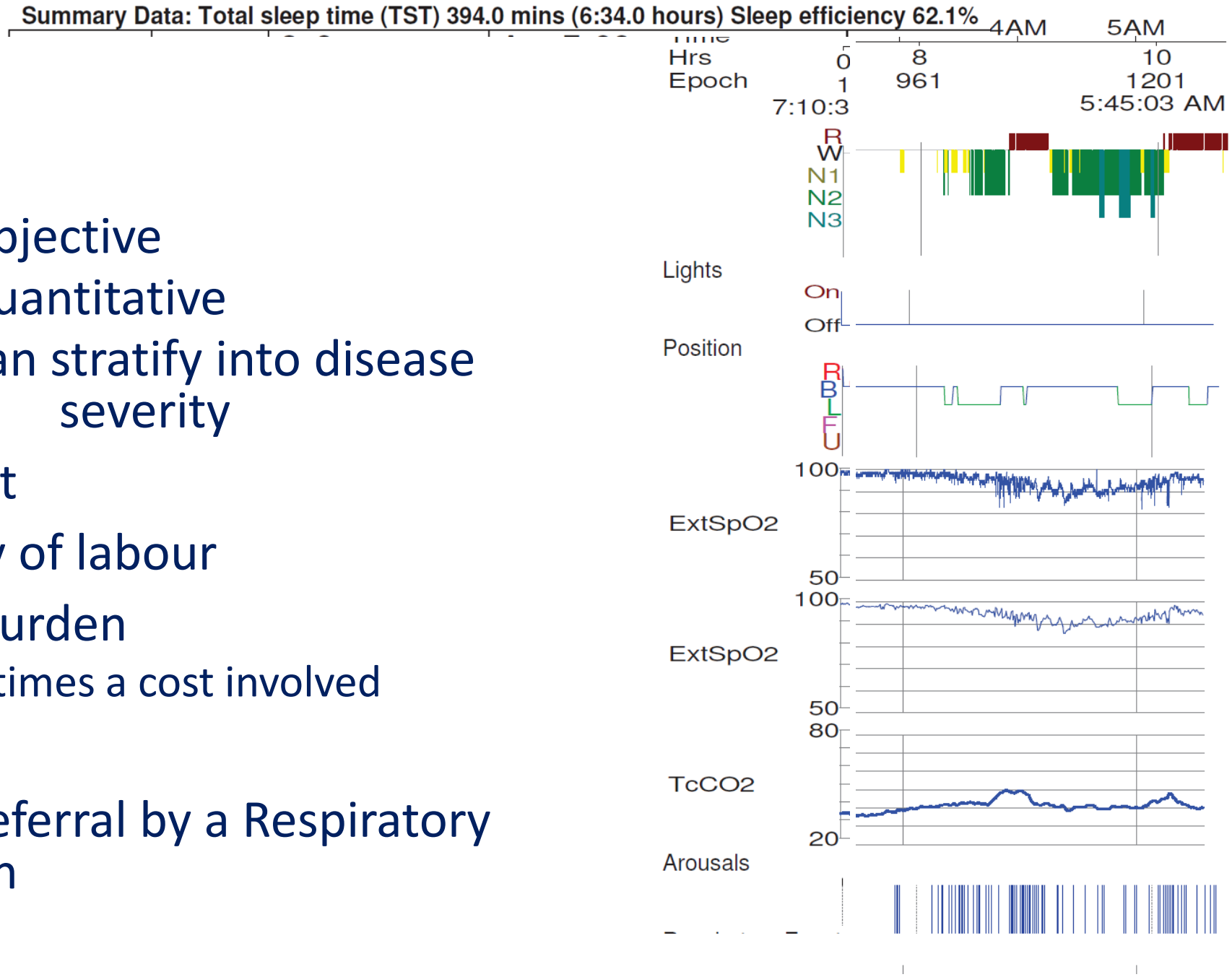
http://www.cpaptalk.com/viewtopic/t46457/New-Method-for-Diagnosing-Sleep-Apnea.html

PSG

- Objective
- Quantitative
- Can stratify into disease severity

- High cost
- Intensity of labour
- Family burden
  - Sometimes a cost involved

- Needs referral by a Respiratory physician



Home videos can be very useful

https://www.youtube.com/watch?v=3GON9iqIH9A

Management options:

1. Topical nasal saline and steroids

Effectiveness of Intranasal Mometasone Furoate vs Saline for Sleep-Disordered Breathing in Children

. 2023 Jan 17;e225258. doi: 10.1001/jamapediatrics.2022.5258.

Almost one-half of children with sleep disordered breathing could be initially managed in the primary care setting and may not require referral to specialist services, as is currently recommended.
Intranasal steroids and saline had similar efficacy in the reduction of children who required tonsillectomy and adenoidectomy.

2. Benefits of **tonsillectomy and adenoidectomy** Successful in 82%

Improvements in:

- Sleep-related symptoms
- Quality of life.

.Surgery may not reverse all the associated decrements in neurocognitive functioning

.Normal PSG postoperatively in 82%

.Improves but **does not resolve** OSA in the majority of obese children

Children with chronic asthma are also more likely to have incomplete resolution of their symptoms

https://journals.sagepub.com/doi/abs/10.1016/j.otohns.2008.12.038
https://journals.sagepub.com/doi/abs/10.1016/j.otohns.2006.02.033
DOI: 10.1016/j.otohns.2007.11.003

Other possible treatment(s) depends on the clinical evaluation and the results of sleep studies

Dental appliances/maxillary advancement splints not available in Victoria for children

Dento-facial development and tonsils and adenoids

- Dento-facial development in snoring children is **not** changed by tonsil and adenoid surgery regardless of symptom relief
- If snoring persists or relapses in children who have had tonsillectomy and adenoidectomy, orthodontic maxillary widening should be considered.

DOI: 10.1016/j.ijporl.2009.10.025

3. Maxillary and mandibular **expansion**

https://www.researchgate.net/figure/Surgical-assisted-rapid-maxillary-expansion-on-the-maxilla-and-Schwarz-appliance-on-the_fig3_246804513

Craniofacial anomalies

4. **Craniofacial Surgery** to improve the airway in a child with Apert syndrome

https://www.youtube.com/watch?v=qIQ9AGLWkR4

5. Continuous positive airway pressure (CPAP)

Constant air pressure delivered through a mask leads to stenting of the airway

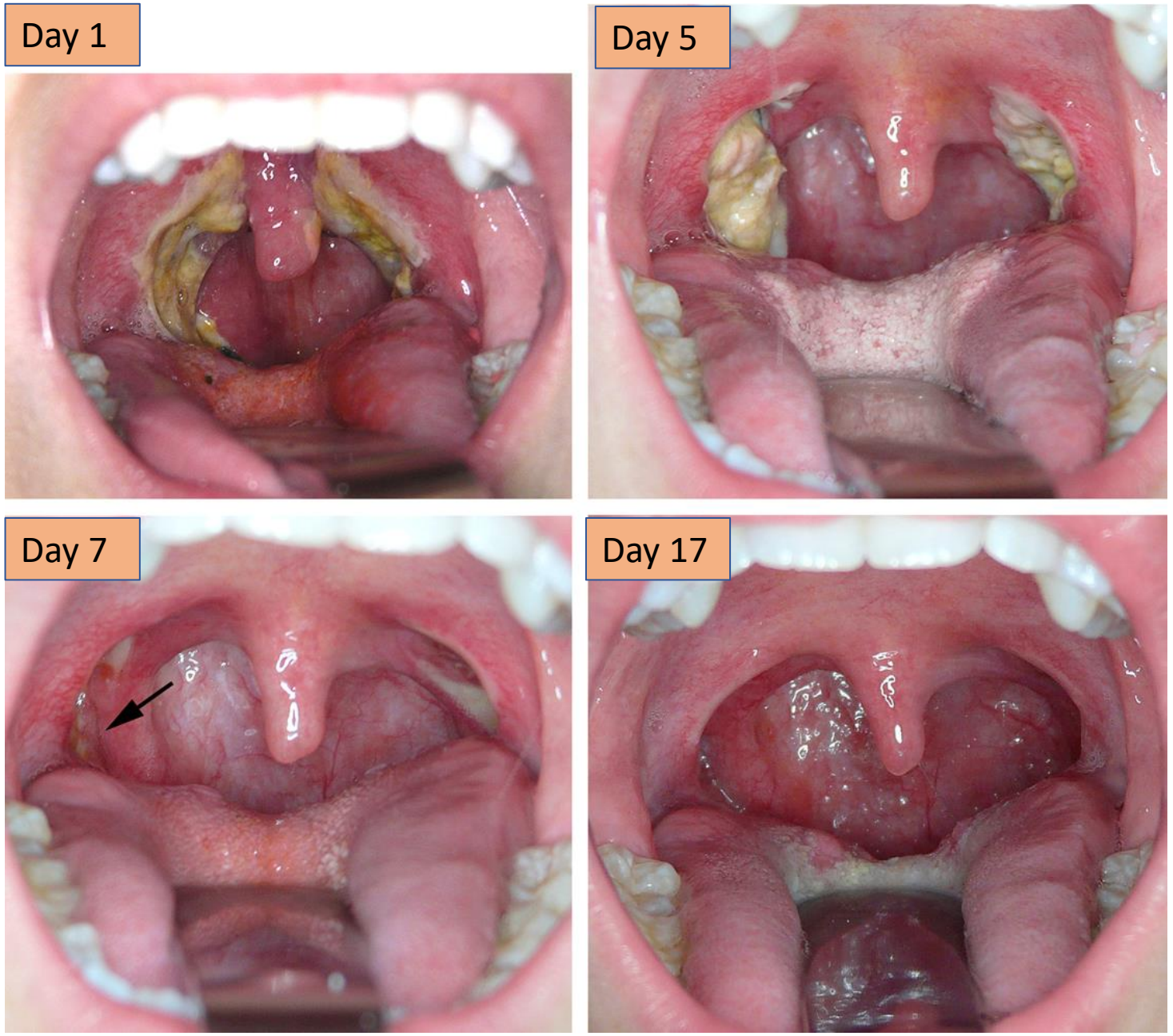
Extremely rare to require a tracheostomy

- Children with craniofacial anomalies

http://www.articles.complexchild.com/july2008/00055.html

Perioperative Problems (after T&A)

- Possible GA complications
- Pain – sore throat, tongue, and referred to the ears
- Dehydration, initial weight loss, halitosis
- Chest infections
- Respiratory support on the night of surgery, with the need for special care ward
- Bleeding and return to theatre
- Possible blood transfusion



https://www.semanticscholar.org/paper/Tonsillectomy-Care-for-the-Pediatrician-Isaacson/27d028d16a557f1fc7c471d895d8965762019013/figure/3

Possible **long-term complications** from tonsillectomy and adenoidectomy surgery

“When you are a Bear of Very Little Brain, and you Think of Things, you find sometimes that a Thing which seemed very Thingish inside you is quite different when it gets out into the open and has other people looking at it.”
— A.A. Milne, *Winnie-the-Pooh*

https://feltmagnet.com/drawing/10-Printable-Classic-Winnie-the-Pooh-Coloring-Sheets

Do children who have tonsillectomy and adenoidectomy have an increased risk of infections and cancer?

Association of Long-Term Risk of Respiratory, Allergic, and Infectious Diseases With Removal of Adenoids and Tonsils in Childhood

Sean G. Byars, PhD; Stephen C. Stearns, PhD; Jacobus J. Boomsma, PhD

Abstract | Full Text

FREE *JAMA Otolaryngol Head Neck Surg.* 2018;144(7):594-603. doi:10.1001/jamaoto.2018.0614

BMC Med. 2023 May 24;21(1):194. doi: 10.1186/s12916-023-02902-x.

Cancer risk following surgical removal of tonsils and adenoids – a population-based, sibling-controlled cohort study in Sweden

Jinfeng Liang [# 1 2], Yi Huang [# 1 2], Li Yin [3], Fatemeh Sadeghi [4], Yanping Yang [1 2], Xue Xiao [1 2], Hans-Olov Adami [3 5], Weimin Ye [3], Zhe Zhang [6], Fang Fang [4]

Affiliations + expand

PMID: 37226237 PMCID: PMC10210283 DOI: 10.1186/s12916-023-02902-x

Infections

- **Tonsillectomy** associated with a tripled risk of respiratory infections (rhinitis, urticaria, conjunctivitis)
  - But reduced tonsillitis
- **Adenoidectomy** associated with a double increase in diseases of the lower respiratory tract

Cancers

Cancer type	HR (95% CI)
Kidney	1.33 (1.16-1.52)
Esophagus	1.26 (0.98-1.63)
Small intestine	1.24 (0.93-1.64)
Pancreas	1.23 (1.05-1.44)
Leukemia	1.22 (1.08-1.37)
Thyroid	1.18 (1.00-1.38)
Connective tissue	1.18 (0.94-1.48)
Stomach	1.16 (0.96-1.40)
Prostate	1.15 (1.09-1.22)
Other endocrine system	1.15 (1.02-1.29)
Non-melanoma skin	1.14 (1.01-1.29)
Testis	1.13 (0.98-1.31)
Lymphoma	1.11 (1.00-1.23)
Any cancer	**1.10 (1.07-1.12)**

JAMA Otolaryngology–Head & Neck Surgery July 2018 Volume 144, Number 7

doi: 10.1186/s12916-023-02902-x

The effect of tonsillectomy on the immune system: A systematic review and **meta-analysis**

International Journal of Pediatric Otorhinolaryngology
Volume 79, Issue 8, August 2015, Pages 1184-1191

There is more evidence to suggest that tonsillectomy has no negative clinical or immunological sequelae on the immune system.

https://doi.org/10.1016/j.ijporl.2015.05.016

The picture which emerges of the possible relationship between tonsillectomy and cancers is obscure and full of contradictions

- The tonsils may contribute to immune cell development differently in different people
- Large tonsils could be indicative both of a greater threat from oncogenic pathogens, and of a high importance of the tonsils in immunologic activity
- Childhood tonsillectomy will probably negatively affect those people who would have highly functional tonsils in adulthood, but not those whose tonsils would gradually lose their importance in immunity as the individual grows

doi: 10.1007/s12026-021-09230-3

Management plan

1. Determine the OSA-5 score

2. If ‘severe’ score, start the referral process to either the Royal Children’s Hospital or Monash Medical Centre

3. Treat with:

a. Topical **nasal saline** for 6 weeks

b. Change to **topical nasal steroids** for 6 weeks if saline is not effective (fluticasone furoate if the child is >2 years old; mometasone furoate if the child is >3 years old). Will need a prescription for fluticasone furoate and for both if under 12 years old

c. Oral montelukast if the child also has asthma.

4. Administer the OSA-5 questionnaire again after the 6-12 weeks of treatment.

Video for how to administer the nasal steroids

https://vimeo.com/263984055

What to avoid to protect your immune system

ULTRA-PROCESSED FOODS HIGH IN SATURATED AND TRANS FATS Potato chips, pastries and fried foods

HIGH SUGAR FOODS Cakes, lollies, ice-cream and chocolate

EXCESS ALCOHOL Health guidelines recommend no more than two standard drinks per day with at least two alcohol free days per week. However, people with diabetes and/or heart disease may need to drink less.

LOW FIBRE INTAKE Choose wholegrains as much as possible, avoid ultra-processed foods, and eat plenty of fruit and vegetables.

LACK OF PHYSICAL ACTIVITY Evidence has shown three weeks of inactivity is equivalent to 30 years of ageing on the cardiovascular system.

Discuss diet

These nutrients are important for normal functioning of your immune system.

They have moderate evidence for protecting against cold and flu, but no connection has been made to the novel coronavirus.

Zinc

Eat lean meat, fish, shellfish, nuts, seeds and legumes.

Vitamin C

Eat oranges, strawberries, tomatoes, broccoli and kiwi fruit.

Vitamin D

Eat eggs, liver and oily fish like salmon, and try to get a daily dose of sunshine at safe times.

This resource was produced by the Allied Health and Education Service team at the Baker Heart and Diabetes Institute.

H:/Baker-Institute_Food-your-immune-system.pdf

Foods that cause inflammation

- Processed meat
- Commercial baked goods
- Bread and pasta made with white flour
- Deep fried items
- Added-sugar foods
- Sugar-sweetened beverages
- Trans fats

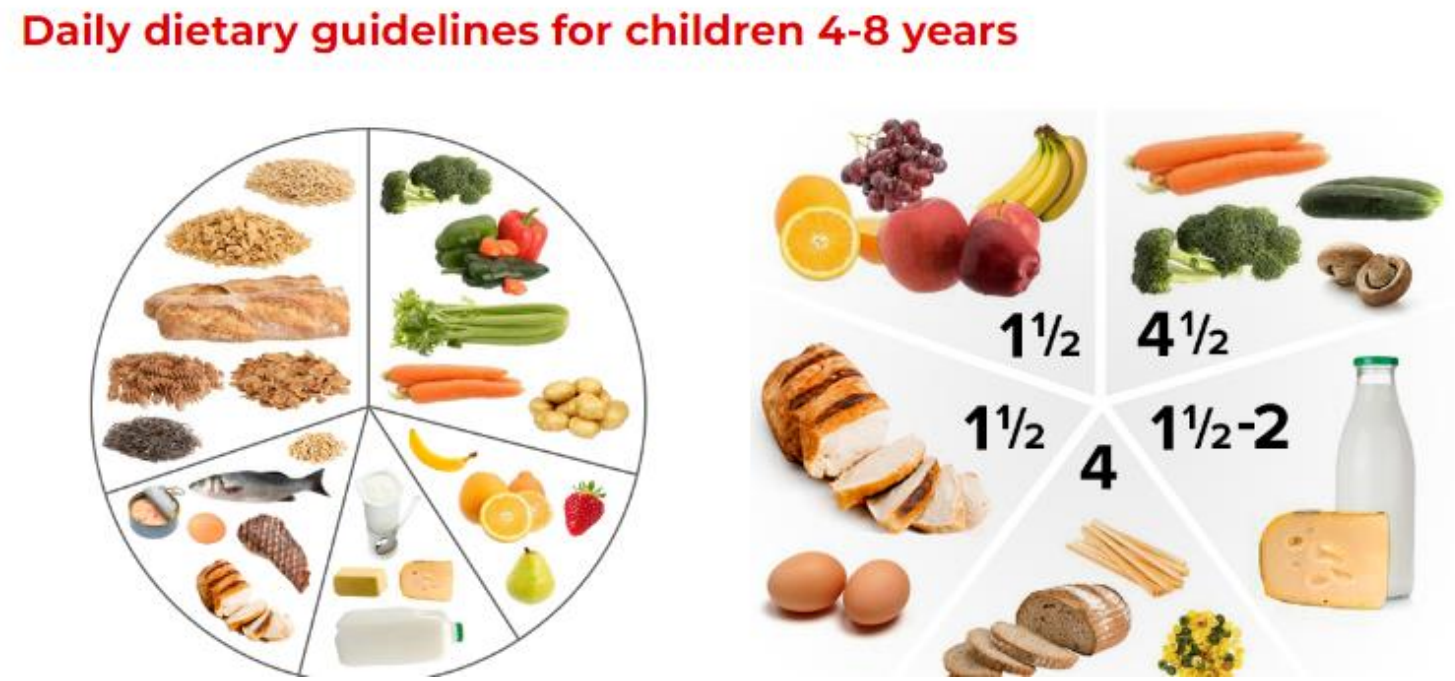
https://www.hopkinsmedicine.org/health/wellness-and-prevention/anti-inflammatory-diet

Anti-inflammatory foods

- Green leafy vegetables
- Fruits
- Tomatoes
- Olive oil
- Nuts like almonds and walnuts (nut pastes)
- Fatty fish

https://www.health.harvard.edu/staying-healthy/foods-that-fight-inflammation

Raising children network – good resources



https://raisingchildren.net.au/preschoolers/nutrition-fitness/daily-food-guides/dietary-guide-4-8-years

Less clear clinical picture:

- There is the possibility of co-morbid sleep problems contributing to the symptom complex

The ideal sleep duration for children is disputed, and it may be that

- Timing of going to sleep and rising
- Sleep fragmentation

May have more impact on health and behaviour outcomes than the ***duration*** of the sleep

Behavioural sleep problems:

Includes:

- difficulties falling asleep at the start of the night
- frequent night waking
- early morning waking
  - or a combination of these

Sleep problems in children
Katrina Hannan, Harriet Hiscock
Australian Family Physician
Volume 44, Issue 12, December 2015

Recommend the child is referred to a Sleep Physician

https://www.racgp.org.au/afp/2015/december/sleep-problems-in-children

If **OSA**, consider referral to RCH or MMC, rather than to the RVEEH if:

- Children under the age of 4 years
- Significant comorbidity (prematurity, congenital heart disease, obesity)
  - Include weight/BMI in the referral
- Clinically severe OSA
- In these groups of children:

There is an increased risk of post-operative respiratory complications:

- monitoring in intensive care

- need for supplemental oxygen or even re-intubation

Therefore, the choice of a location for the surgery should reflect that possibility

Summary – Sleep disordered breathing (SDB)

- Snoring is common in childhood and is the key symptom of OSA
- OSA has an adverse impact on:
  - sleep quality
  - daytime functioning
  - cardiovascular health
- Children with mild SDB may have neurocognitive and behavioural concerns and will benefit from treatment
- Treatment with adenotonsillectomy is usually effective
- Anti-inflammatory agents should be considered for children with nasal obstruction and mild symptoms.

MIST Trial

https://www.mcri.edu.au/research/projects/mist-plus

Laminated posters are available by e-mailing: deborah.anderson@mcri.edu.au

Resources

- The Sleep Health Foundation

www.sleephealthfoundation.org.au/check-list/children-and-sleep.html

- Raising Children Network has videos and educational materials on managing night feeds, dummies and implementing camping out and controlled comforting, www.raisingchildren.net.au
- The Royal Children's Hospital Melbourne has examples of sleep diaries, www.rch.org.au/genmed/clinical_resources
- The RACGP's *Handbook of non-drug interventions* (HANDI) has links to an online training program (one hour, RACGP accredited) in evidence-based management of infant sleep problems, with parent education materials translated into eight languages, www.racgp.org.au/your-practice/guidelines/handi/interventions/children/behavioural-interventions-for-infant-sleep-problems-and-maternal-mood

References

1. **CHAT** study (Childhood Adenotonsillectomy Study)

   N Engl J Med. 2013 June 20; 368(25): 2366–2376
   doi:10.1056/NEJMoa1215881

   Children with OSA on PSG (Polysomnography) were randomly assigned to early T&A or wait for 7 months

   - *No difference in attention scores*

2. Effectiveness of Intranasal Mometasone Furoate *vs* Saline for Sleep-Disordered Breathing in Children

2023 Jan 17;e225258. doi: 10.1001/jamapediatrics.2022.5258

Almost one-half of children with sleep disordered breathing could be managed initially in the primary care setting and may not require referral to specialist services, as is currently recommended.

Intranasal steroids and saline had similar efficacy in the reduction of children who required tonsillectomy and adenoidectomy.

3. Montelukast for Children With Obstructive Sleep Apnea: A Double-blind, Placebo-Controlled Study

Aviv D. Goldbart, Sari Greenberg-Dotan and Asher Tal; *Pediatrics*; originally published online August 6, 2012;
DOI: 10.1542/peds.2012-0310

Montelukast effectively reduced:

- *polysomnographic findings*
- *symptoms*
- *size of the adenoidal tissue*

Although there is concern that some children have behavioural issues on treatment with montelukast, these resolve when the medication is ceased.

OSA

- https://doi.org/10.1016/j.ijporl.2018.07.029

  The OSA-5: Development and validation of a brief questionnaire screening tool for obstructive sleep apnea in children☆
  International Journal of Pediatric Otorhinolaryngology
  Volume 113, October 2018, Pages 62-66

  - Sleep Architecture in Children With Common Phenotype of Obstructive Sleep Apnea

  J Clin Sleep Med. 2018 Jan 15; 14(1): 9–14. doi: 10.5664/jcsm.6868

- Development of craniofacial and dental arch morphology in relation to sleep disordered breathing from 4 to 12 years. Effects of adenotonsillar surgery. *Int J Paediatr Otorhinolaryngology 2010 Feb;74(2):137-43*DOI: 10.1016/j.ijporl.2009.10.025

Immunol Res. 2021; 69(6): 467–470.
Published online 2021 Sep 15. doi: 10.1007/s12026-021-09230-3
PMCID: PMC8580919
PMID: 34523058

Tonsillectomy and the incidence of various types of cancer

Gábor Holló

- Acknowledgement of the Red Flag

https://www.etsy.com/au/listing/1227846775/red-flag-svg-flag-svg-red-flags-svg

Thank you for your attention!