Assessment of cough from upper airway

2023.09.23

가톨릭대학교 이비인후과 김현범

External auditory meatus

Postnasal drip

Laryngitis

검사와 약물치료 해보고
적당한 시기에 보내자!!

전공의

막내 staff

Cause of cough

- Acute infections: tracheobronchitis, bronchopneumonia, viral pneumonia, acute-on-chronic bronchitis, pertussis
- Chronic infections: bronchiectasis, tuberculosis, cystic fibrosis
- Airway diseases: asthma, chronic bronchitis, chronic postnasal drip
- Parenchymal diseases: chronic interstitial lung fibrosis, emphysema, sarcoidosis
- Tumours: bronchogenic carcinoma, alveolar cell carcinoma, benign airway tumours, mediastinal tumours
- Foreign bodies
- Irritation of external auditory meatus
- Cardiovascular diseases: left ventricular failure, pulmonary infarction, aortic aneurysm
- Other diseases: reflux oesophagitis, recurrent aspiration, endobronchial sutures
- Drugs: angiotensin-converting enzyme inhibitors

Chung KF, Pavord ID. Prevalence, pathogenesis, and causes of chronic cough. Lancet. 2008 Apr 19;371(9621):1364-74. doi: 10.1016/S0140-6736(08)60595-4. PMID: 18424325.

1. Ear irrigation

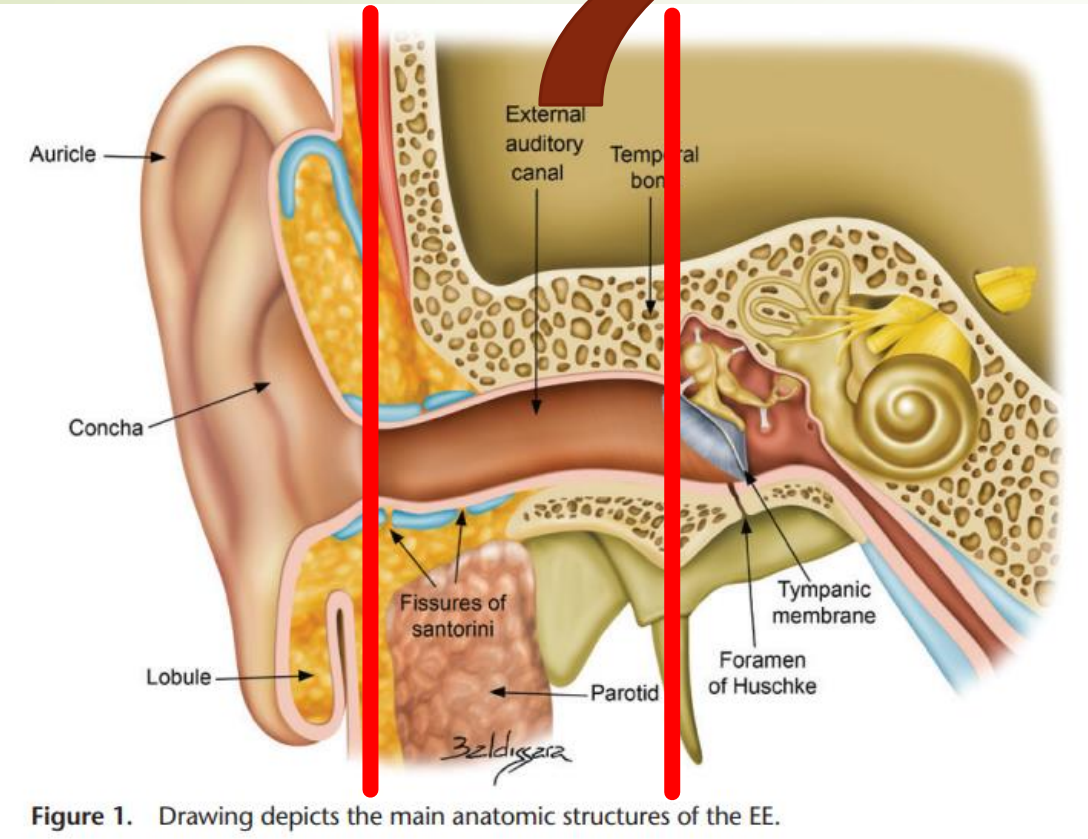


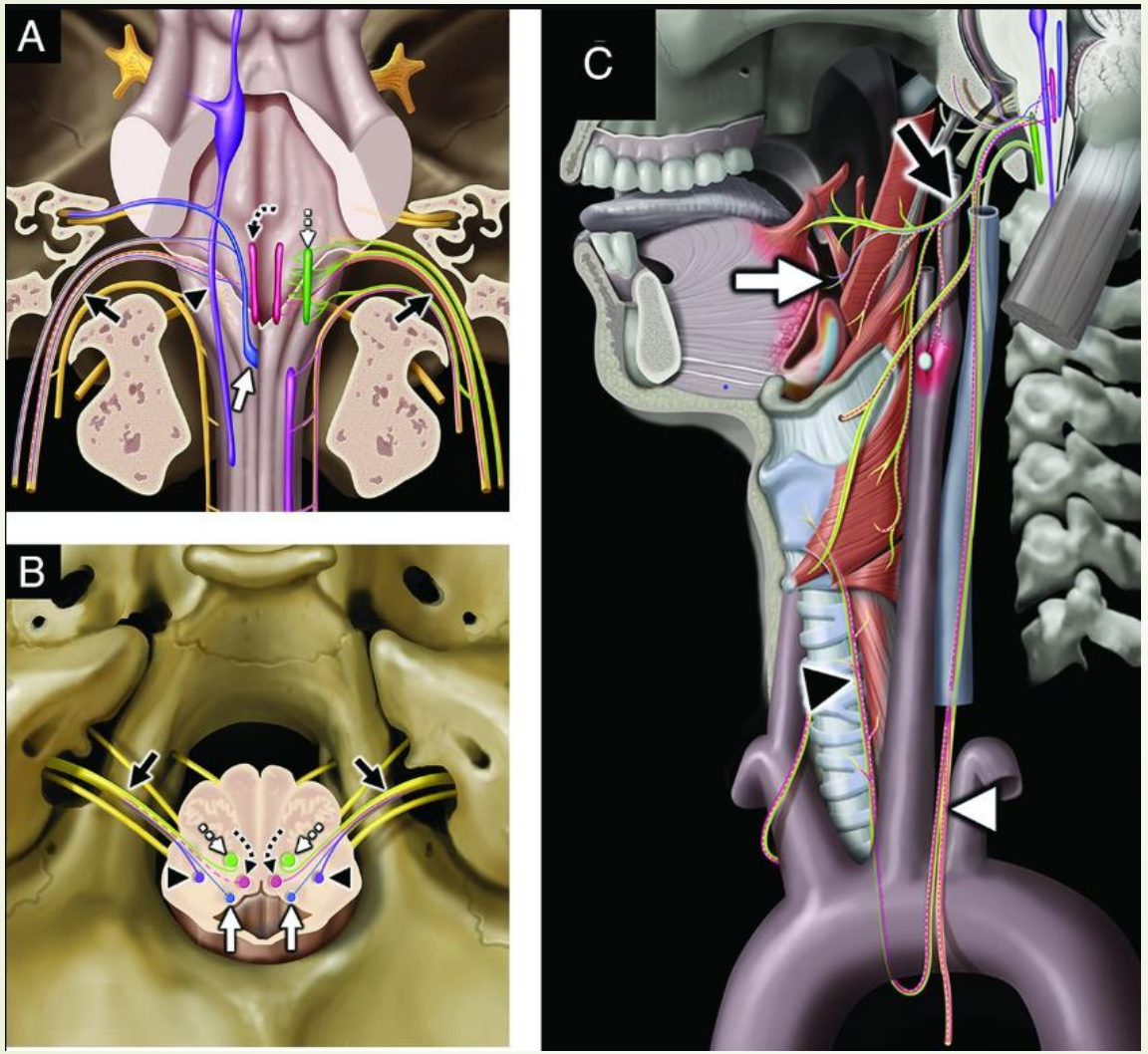
Figure 1. Drawing depicts the main anatomic structures of the EE.

■ 그림 1-12. 외이도의 각 부위별 신경의 분포

Arnold`s nerve

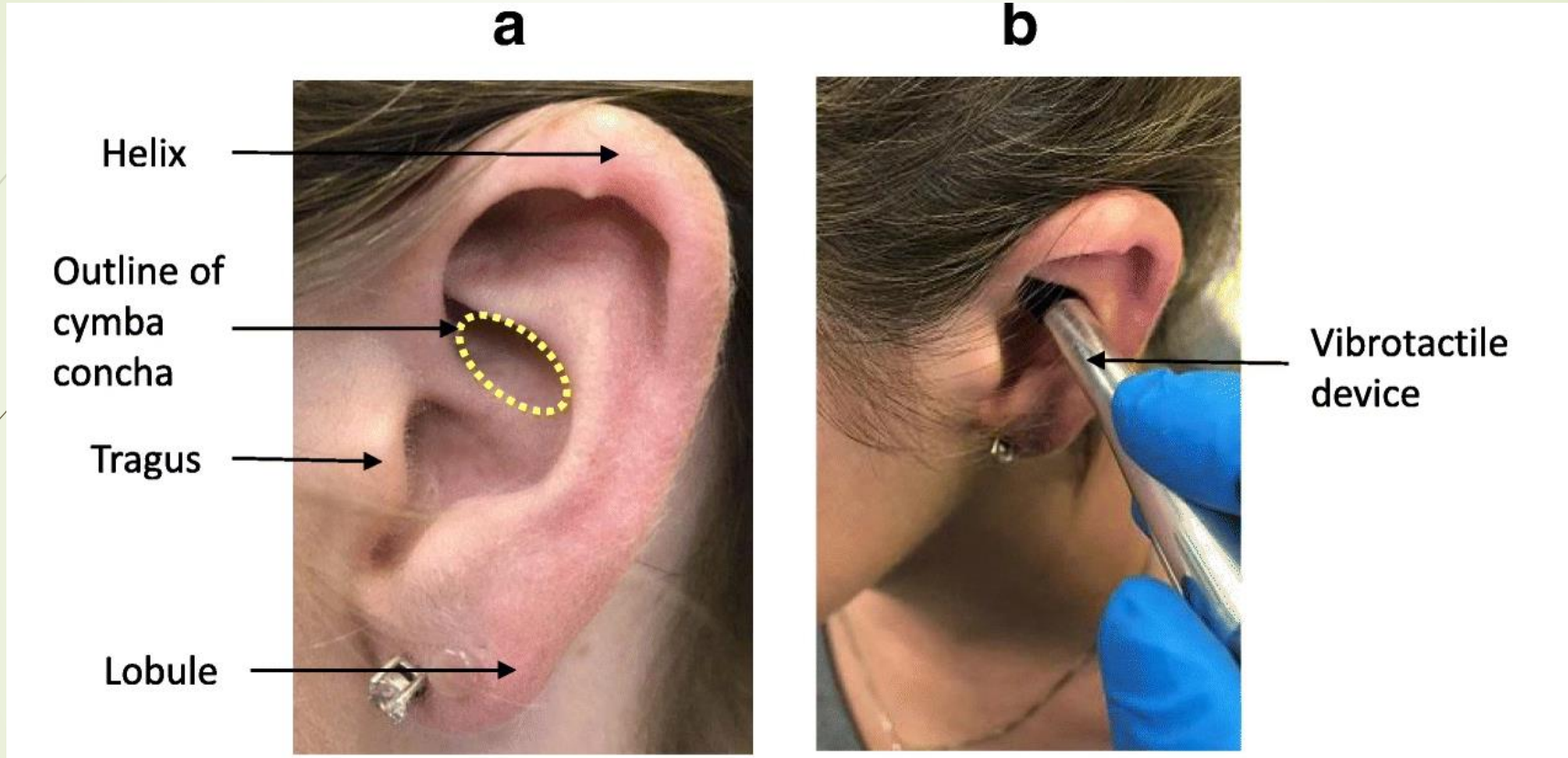
Imaging the External Ear: Practical Approach to Normal and Pathologic Conditions, Neuroradiology
이비인후과학, 대한이비인후과학회

1-1. referred otalgia



Norris CD, Koontz NA. Secondary Otalgia: Referred Pain Pathways and Pathologies. AJNR Am J Neuroradiol. 2020 Dec;41(12):2188-2198. doi: 10.3174/ajnr.A6808. Epub 2020 Oct 22. Erratum in: AJNR Am J Neuroradiol. 2021 Jan;42(2):E6. PMID: 33093134; PMCID: PMC7963252.

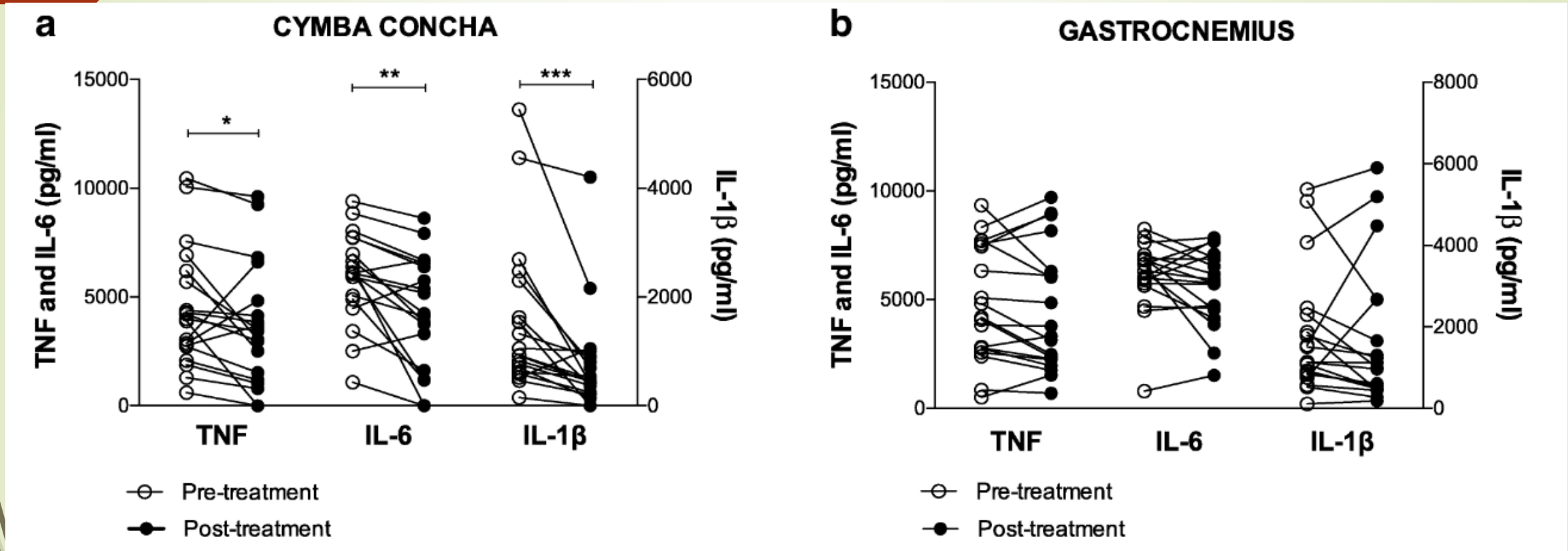
1-2. Vagus nerve in ear



Site of application of vibrotactile device to the cymba concha of the ear. (**a**) Major anatomical landmarks of the external ear (pinna) with approximate outline of the cymba concha. The cymba concha is a highly-conserved anatomical feature of the external ear that was identified by the device operator. (**b**) Representative device placement of the vibrotactile device in contact with the cymba concha

Addorisio ME, Imperato GH, de Vos AF, Forti S, Goldstein RS, Pavlov VA, van der Poll T, Yang H, Diamond B, Tracey KJ, Chavan SS. Investigational treatment of rheumatoid arthritis with a vibrotactile device applied to the external ear. Bioelectron Med. 2019 Apr 17;5:4. doi: 10.1186/s42234-019-0020-4. PMID: 32232095; PMCID: PMC7098240.

1-2. Vagus nerve in ear



Addorisio ME, Imperato GH, de Vos AF, Forti S, Goldstein RS, Pavlov VA, van der Poll T, Yang H, Diamond B, Tracey KJ, Chavan SS. Investigational treatment of rheumatoid arthritis with a vibrotactile device applied to the external ear. Bioelectron Med. 2019 Apr 17;5:4. doi: 10.1186/s42234-019-0020-4. PMID: 32232095; PMCID: PMC7098240.

2. postnasal drip

Suggestions and considerations in evaluation of postnasal drip

History and physical

- ACE inhibitor
- Smoking history
- Chest Xray

CVA

- Trial of antiasthmatic therapy
- Methacholine inhalational challenge

GERD

- Trial of antireflux therapy
- 24hr pH probe monitoring
- Barium esophagram

UACS secondary to:

Allergic rhinitis

- Oral antihistamine
- Inhaled nasal antihistamine
- Inhaled nasal steroid
- Cromolyn
- Leukotriene inhibitor
- Allergy testing and desensitization

Nonallergic rhinitis

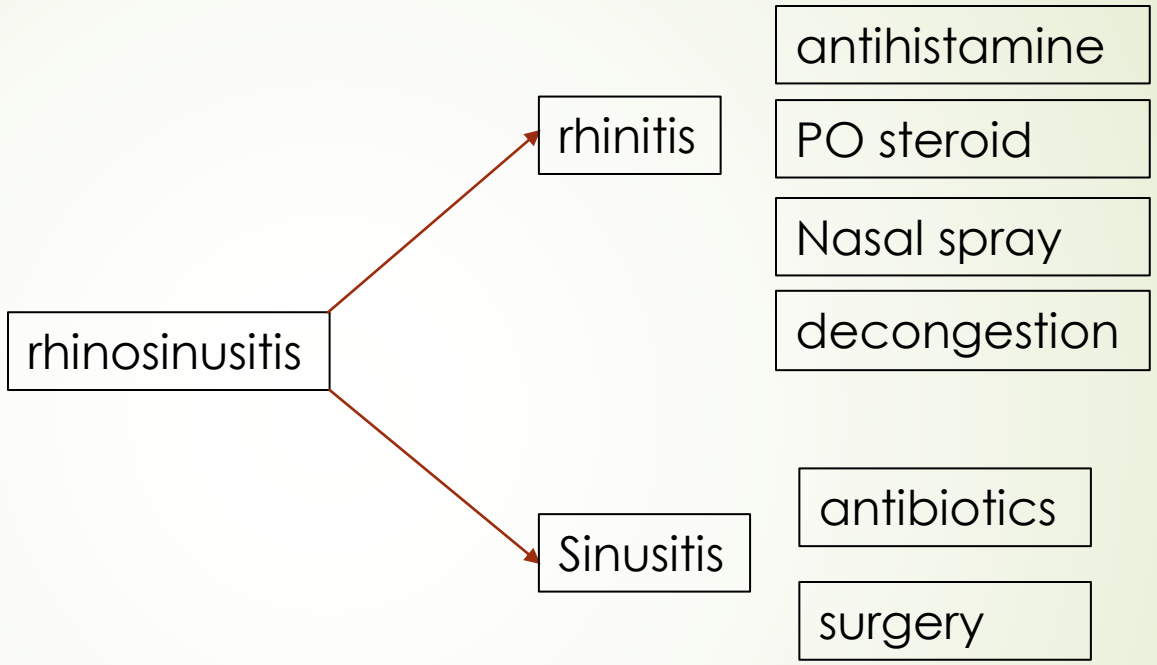
- Oral antihistamine
- Inhaled nasal antihistamine
- Decongestant
- Ipratropium bromide

Acute/chronic sinusitis

- Antibiotics
- Intranasal steroids
- Decongestant
- Imaging of sinuses
- Surgical intervention

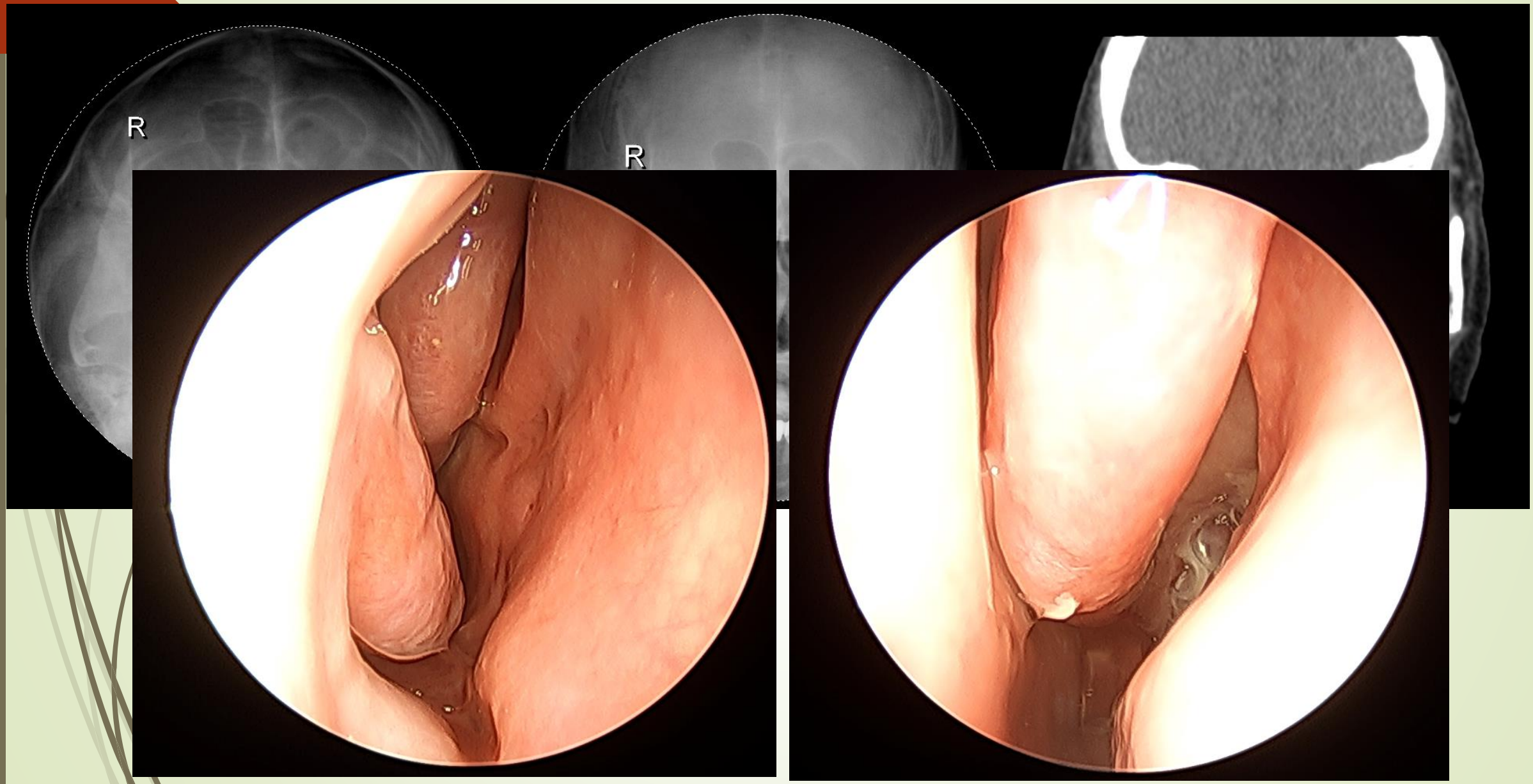
Chemical irritant/rhinitis medicamentosa

- Cessation of medication
- Avoidance of chemical irritant
- Use of filters, masks, improvement in ventilation

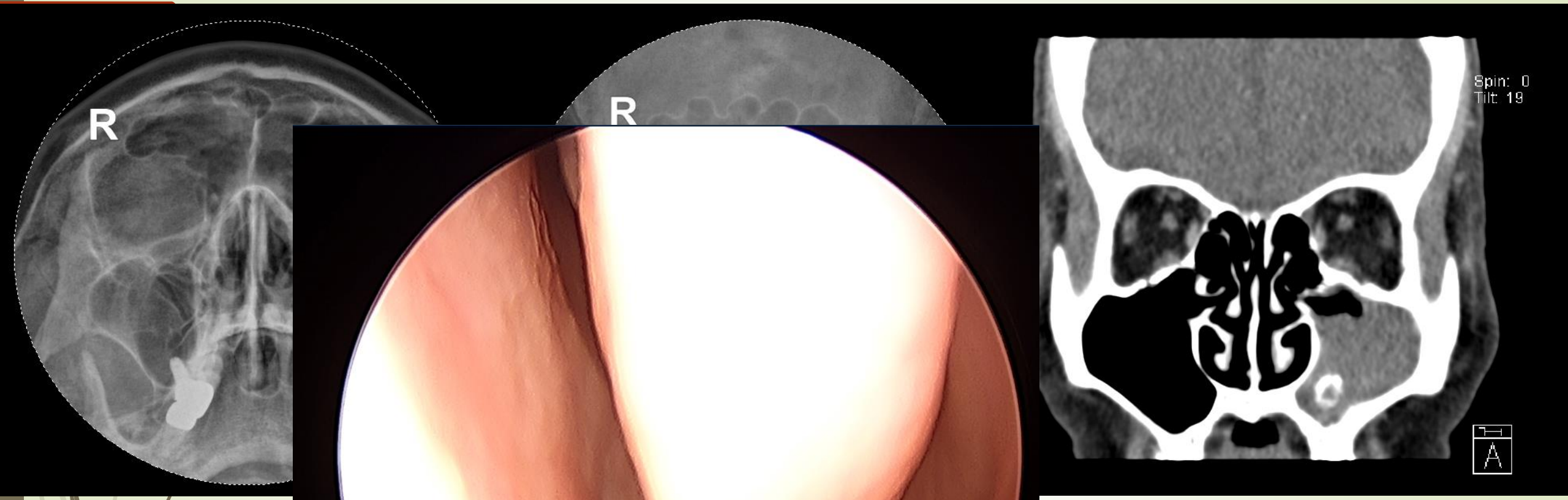


Yu JL, Becker SS. Postnasal drip and postnasal drip-related cough. Curr Opin Otolaryngol Head Neck Surg. 2016 Feb;24(1):15-9. doi: 10.1097/MOO.0000000000000226. PMID: 26731683.

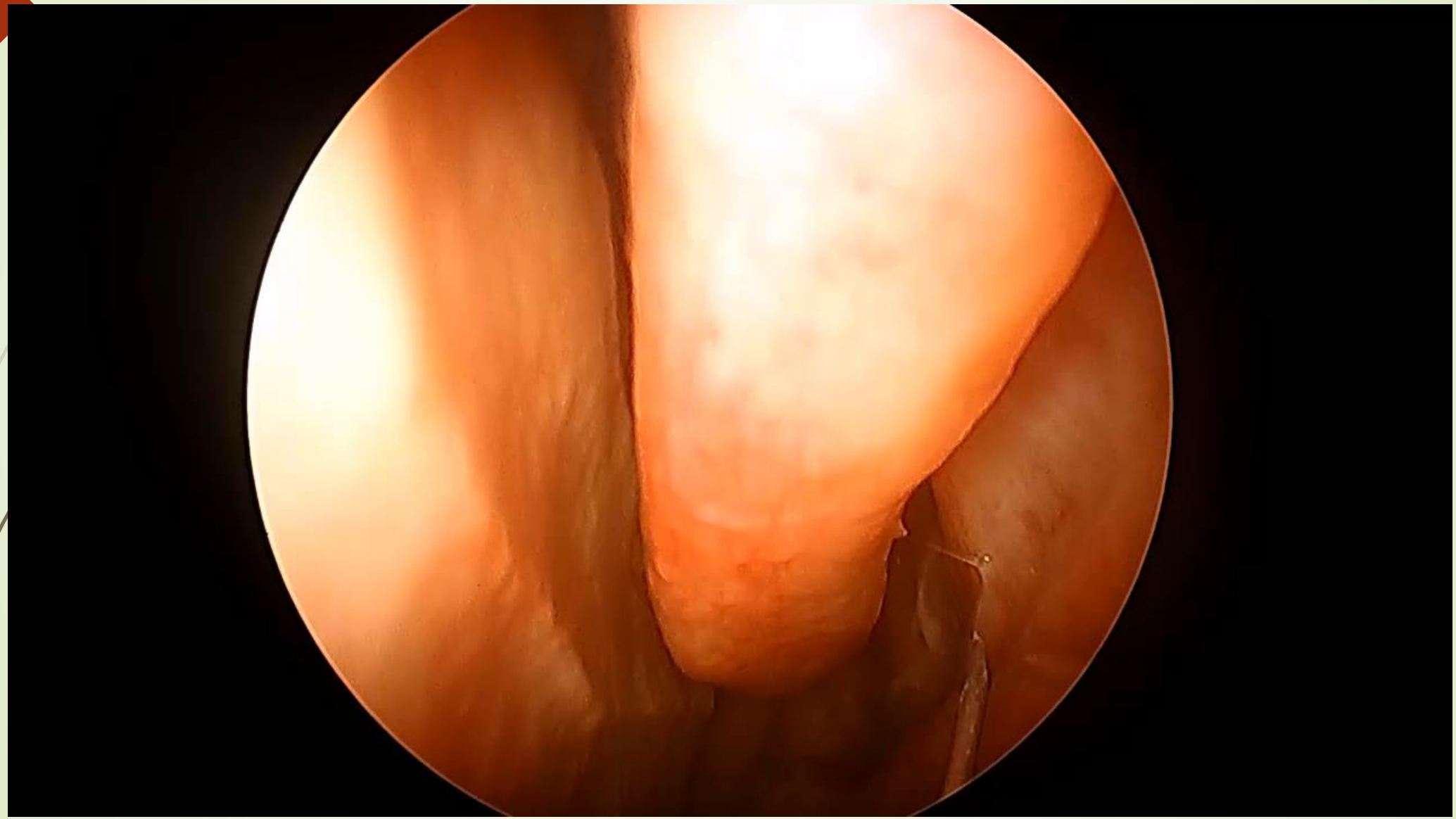
2-1 sinusitis



2-1 sinusitis



2-1 sinusitis



2-1 sinusitis

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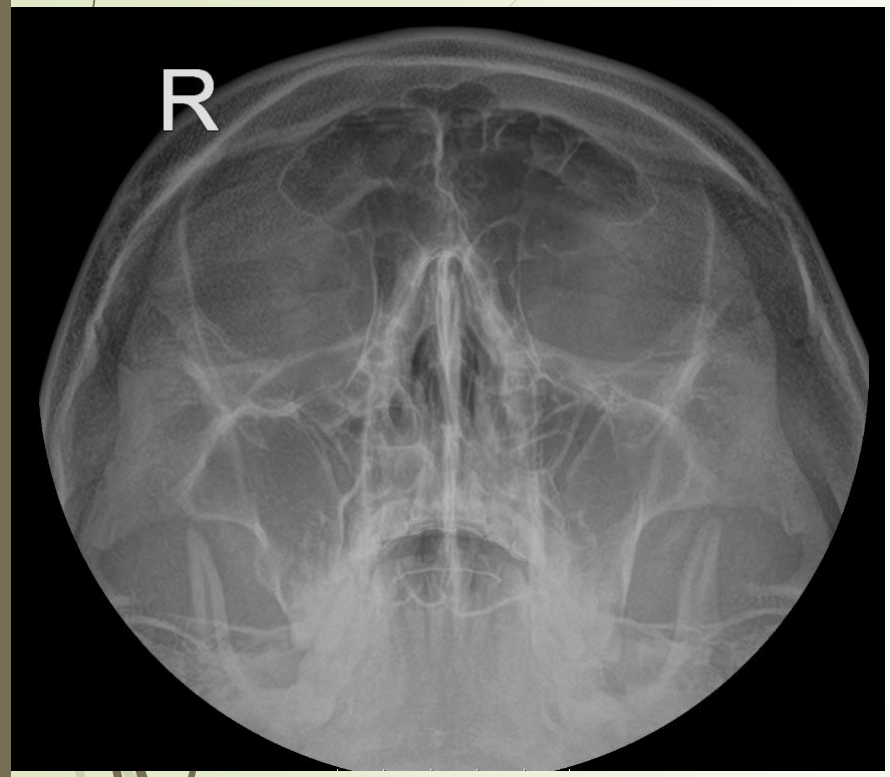
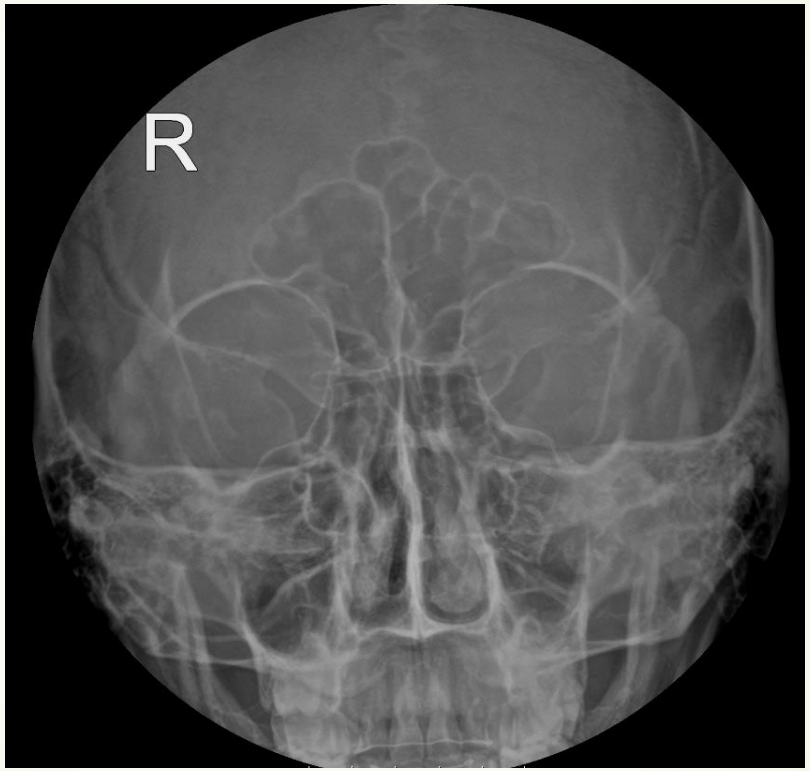
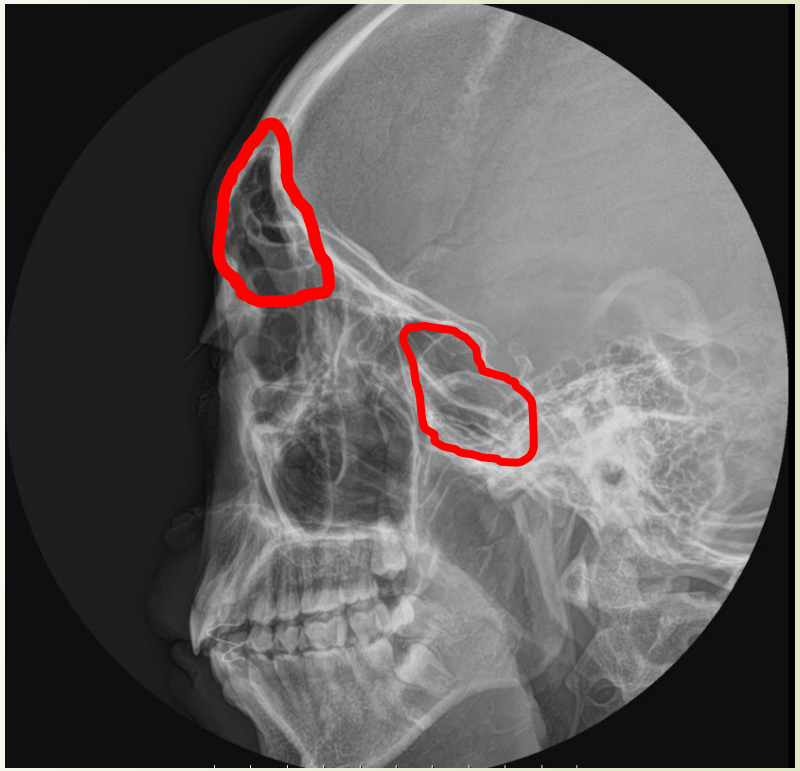






2-2 rhinitis

2-2 rhinitis

Box 1
Types of rhinitis

Nonallergic Rhinitis
- Vasomotor Rhinitis
- Nonallergic Rhinitis with Eosinophilia

Rhinitis due to Anatomic Abnormalities

Rhinitis due to Physical or Chemical Irritants

Occupational Rhinitis

Rhinitis Medicamentosa

Rhinitis of Pregnancy

Donaldson AM. Upper Airway Cough Syndrome. Otolaryngol Clin North Am. 2023 Feb;56(1):147-155. doi: 10.1016/j.otc.2022.09.011. Epub 2022 Oct 22. PMID: 36283869.

2-2 rhinitis

Table 1
Treatment recommendations for upper airway cough syndrome based on country

United States	AR: Nonsedating antihistamine/decongestant NAR: Sedating antihistamine/decongestant CRS: Sedating antihistamine/decongestant; nasal steroid spray, antibiotics if appropriate
United Kingdom	AR: Nasal steroid spray
Europe	AR: Nonsedating antihistamine/decongestant
Japan[24]	AR: Nasal steroid spray/antihistamine UACS only nasal steroid spray
Australia	AR: Antihistamine CRS: Nasal steroid spray/antibiotic if appropriate
China	AR: Nasal steroid spray/antihistamine, decongestant if appropriate NAR: Sedating antihistamine/decongestant CRS: Nasal steroid spray; sedating antihistamine/decongestant; macrolide therapy; antibiotic if appropriate

Donaldson AM. Upper Airway Cough Syndrome. Otolaryngol Clin North Am. 2023 Feb;56(1):147-155. doi: 10.1016/j.otc.2022.09.011. Epub 2022 Oct 22. PMID: 36283869.

3. Cough from larynx (cough hypersensitivity)

- Cause
  - infection (bacterial, viral, fungal)
  - inflammatory(reflux, ulcer, laryngitis sicca, allergic)
  - systemic (sarcoidosis, amyloidosis)
  - autoimmune (granulomatosis)

Zhukhovitskaya A, Verma SP. Identification and Management of Chronic Laryngitis. Otolaryngol Clin North Am. 2019 Aug;52(4):607-616. doi: 10.1016/j.otc.2019.03.004. Epub 2019 May 14. PMID: 31101358.

3. Cough from larynx (cough hypersensitivity)

- Pathophysiology

-> peripheral

1) vagus ganglia
2) thinly myelinated Aδ fiber
   unmyelinated C-fiber
3) larynx, trachea, large bronchi

-> central

1) inflammatory mediators (NGF, BDNF, GDNF), cytokines (IL-1β, IL-6, TNF)
2) nucleus of the solitary tract

Chung KF, McGarvey L, Song WJ, Chang AB, Lai K, Canning BJ, Birring SS, Smith JA, Mazzone SB. Cough hypersensitivity and chronic cough. Nat Rev Dis Primers. 2022 Jun 30;8(1):45. doi: 10.1038/s41572-022-00370-w. PMID: 35773287; PMCID: PMC9244241.

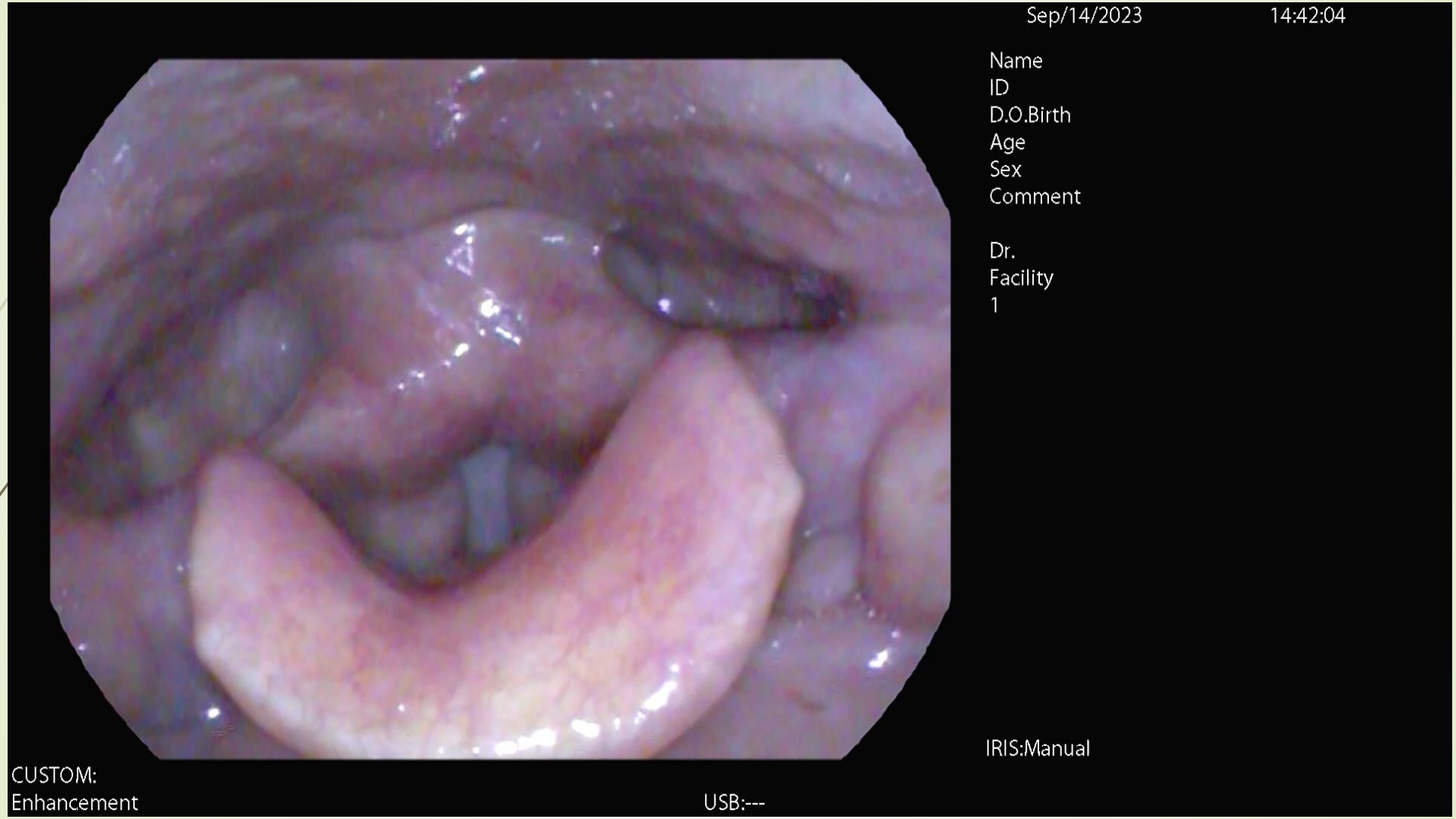
3-1. Symptoms of larynx

- Symptom (+ cough)
  - globus symptom
  - itching sensation
  - voice change
  - sore throat, odynophagia
  - sputum, PND

3-1. Symptoms of larynx

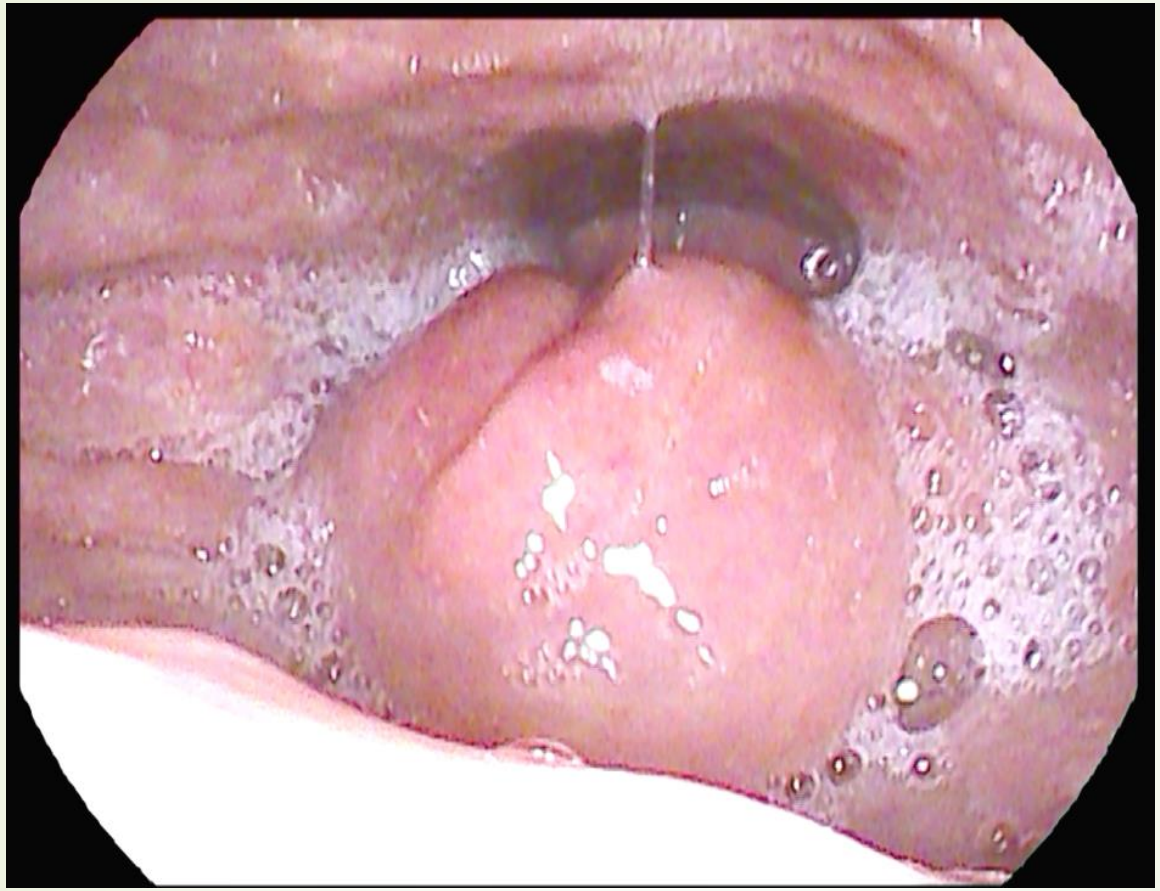
Normal larynx

3-1. Symptoms of larynx



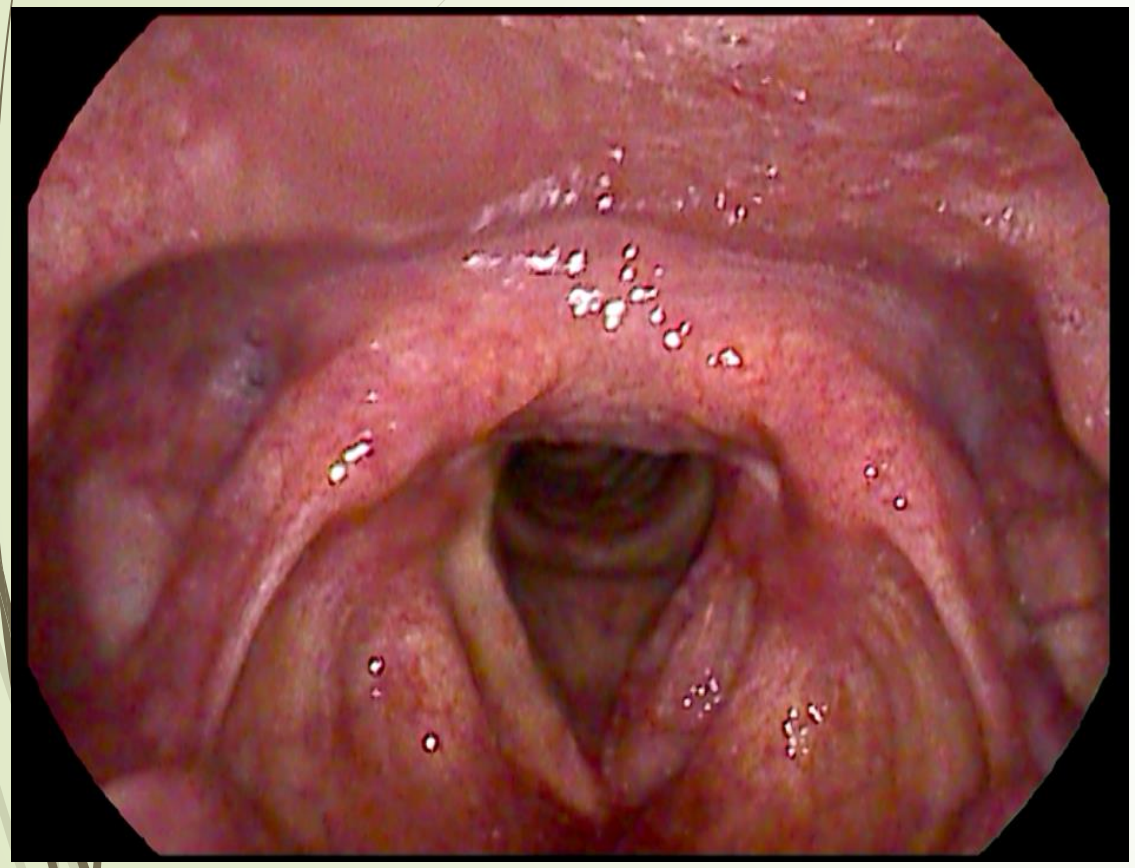
Normal larynx

3-1. Symptoms of larynx

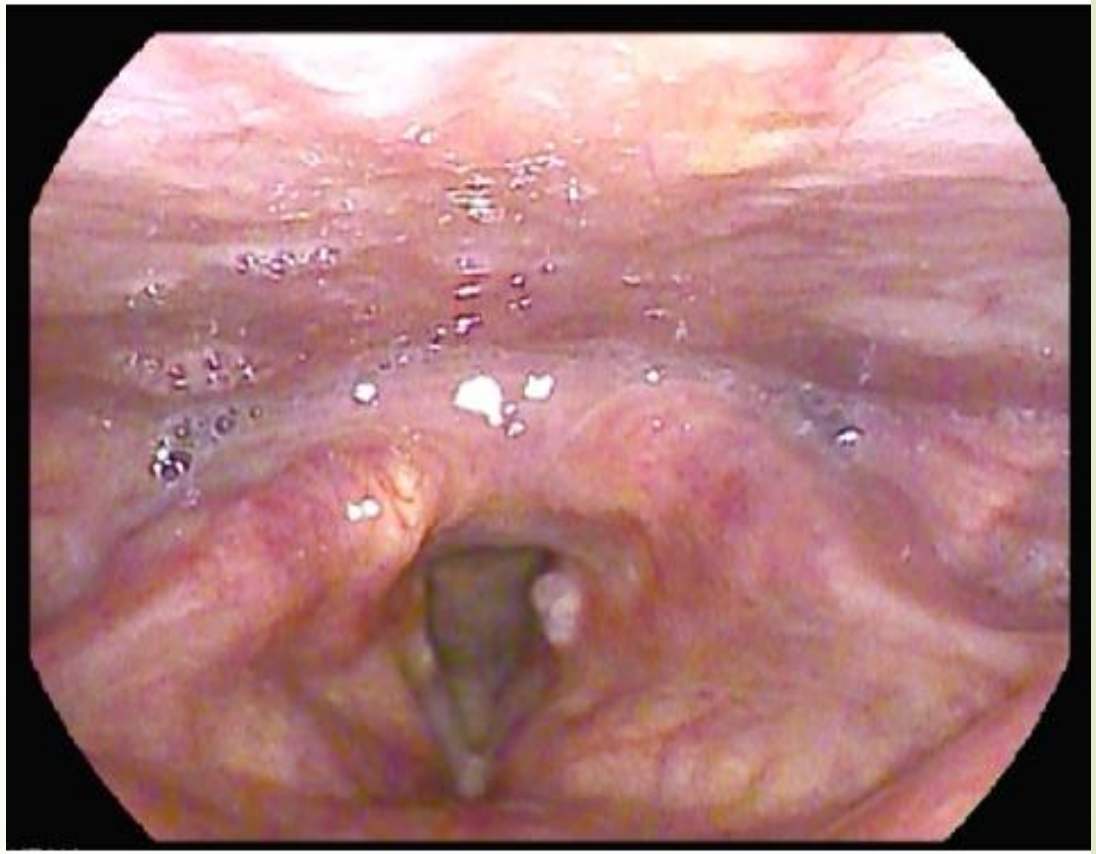


Cough (저녁) + globus Sx

3-1. Symptoms of larynx

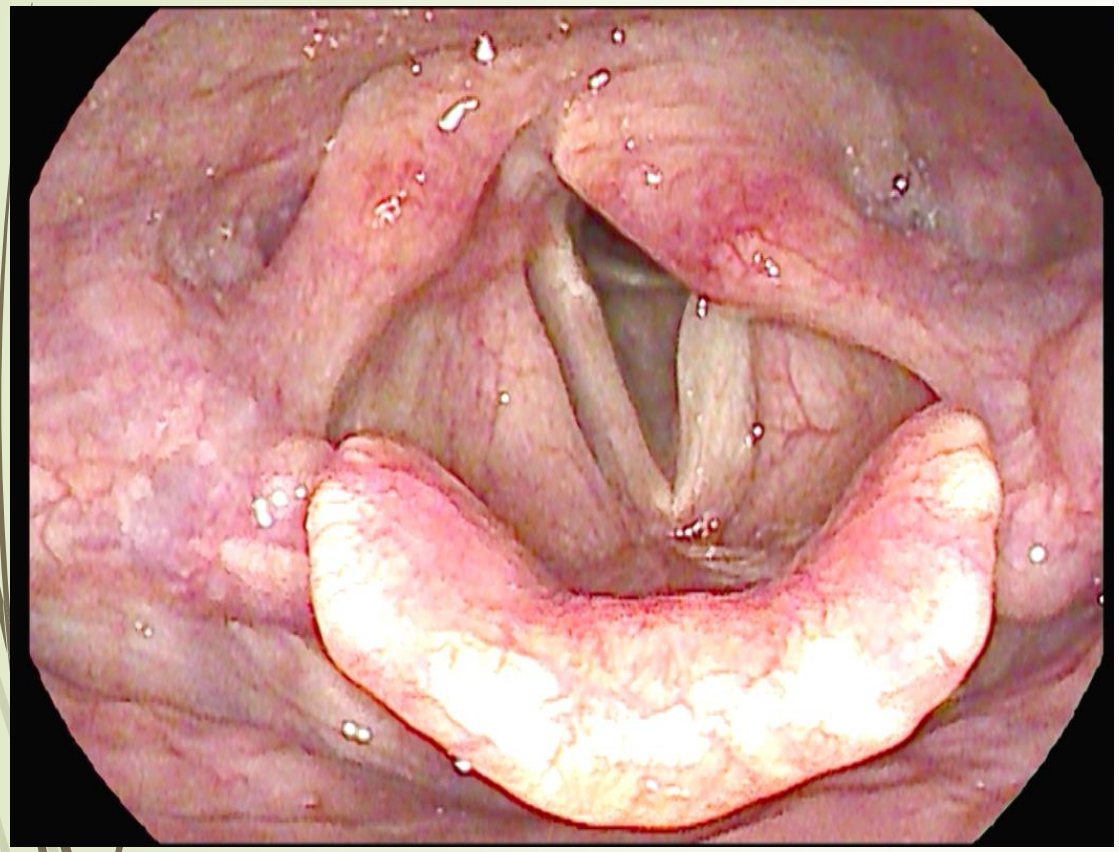


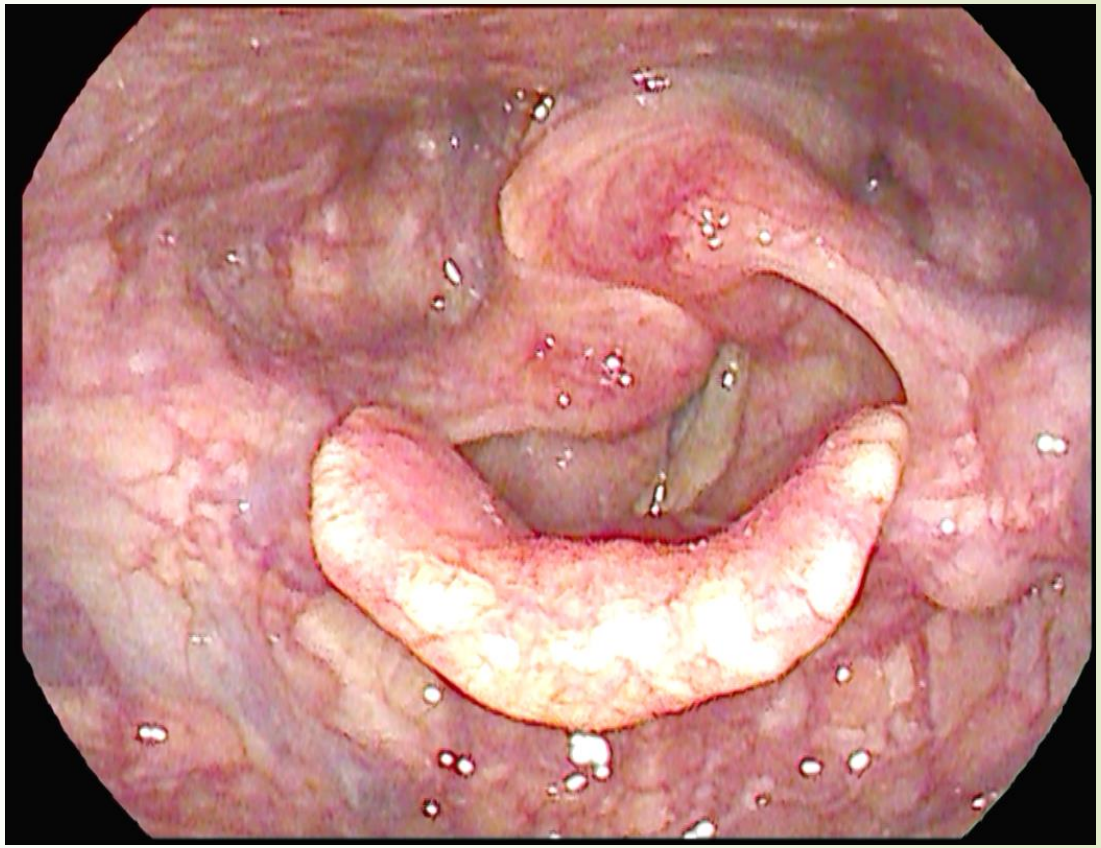
Voice change + cough
->glottis cancer



Voice change + cough
->granuloma

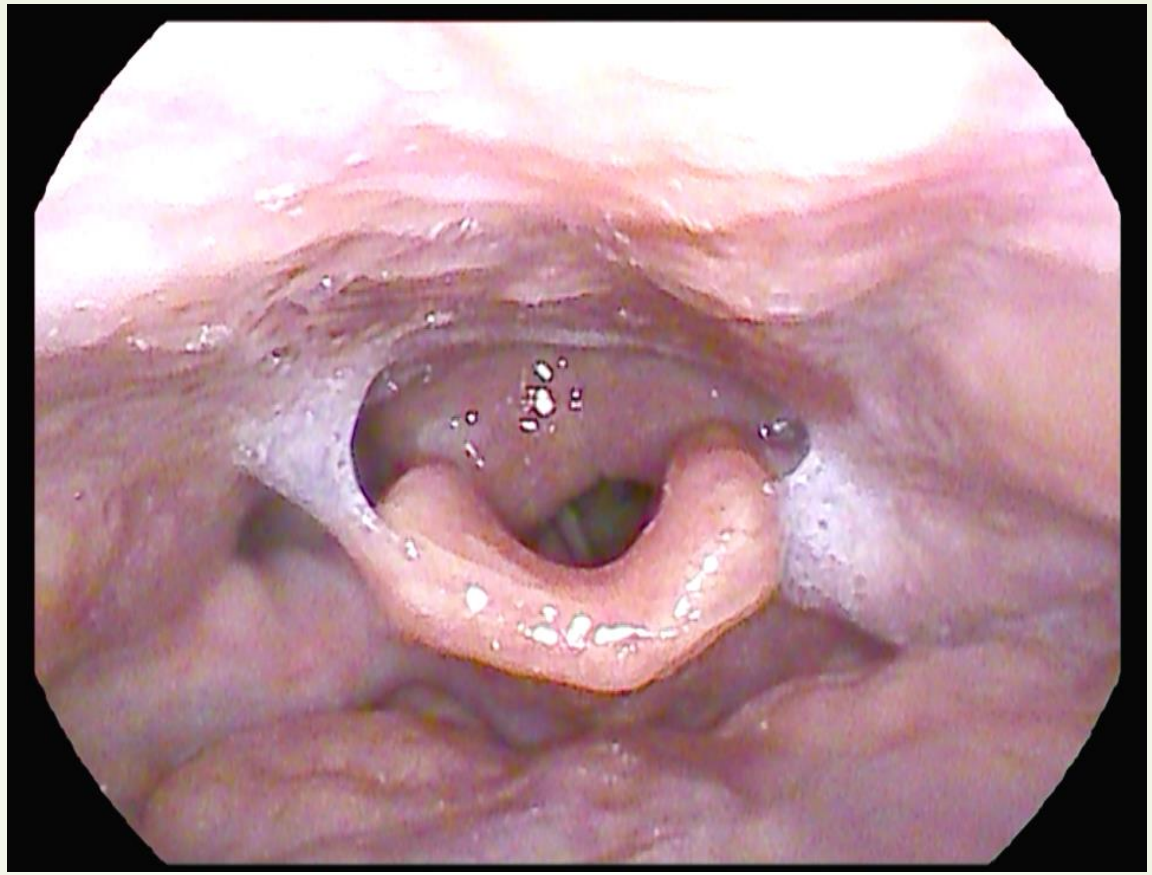
3-1. Symptoms of larynx





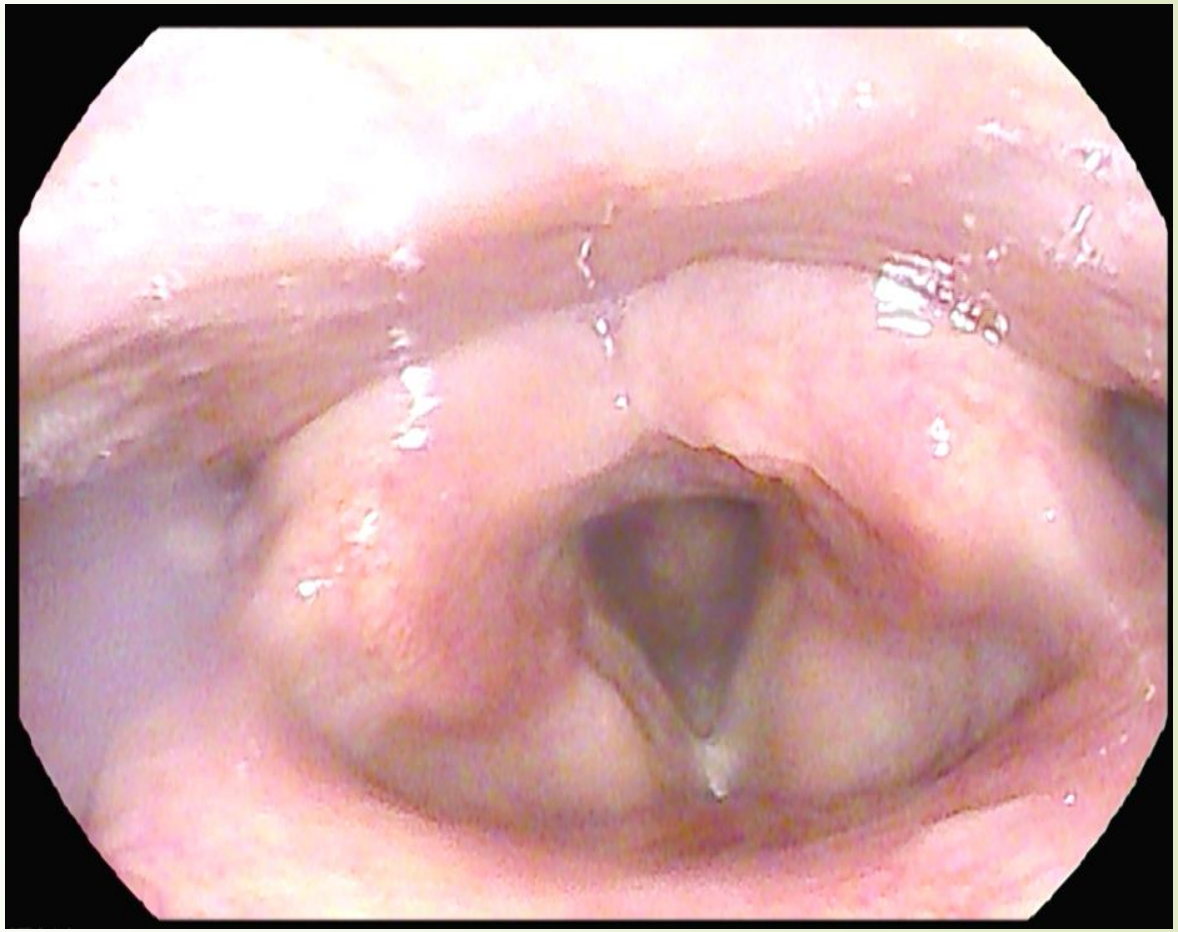
globus Sx + Voice change + cough
->Lt. vocal paralysis

3-1. Symptoms of larynx



Sputum + itching sensation + cough
->smoker

3-1. Symptoms of larynx



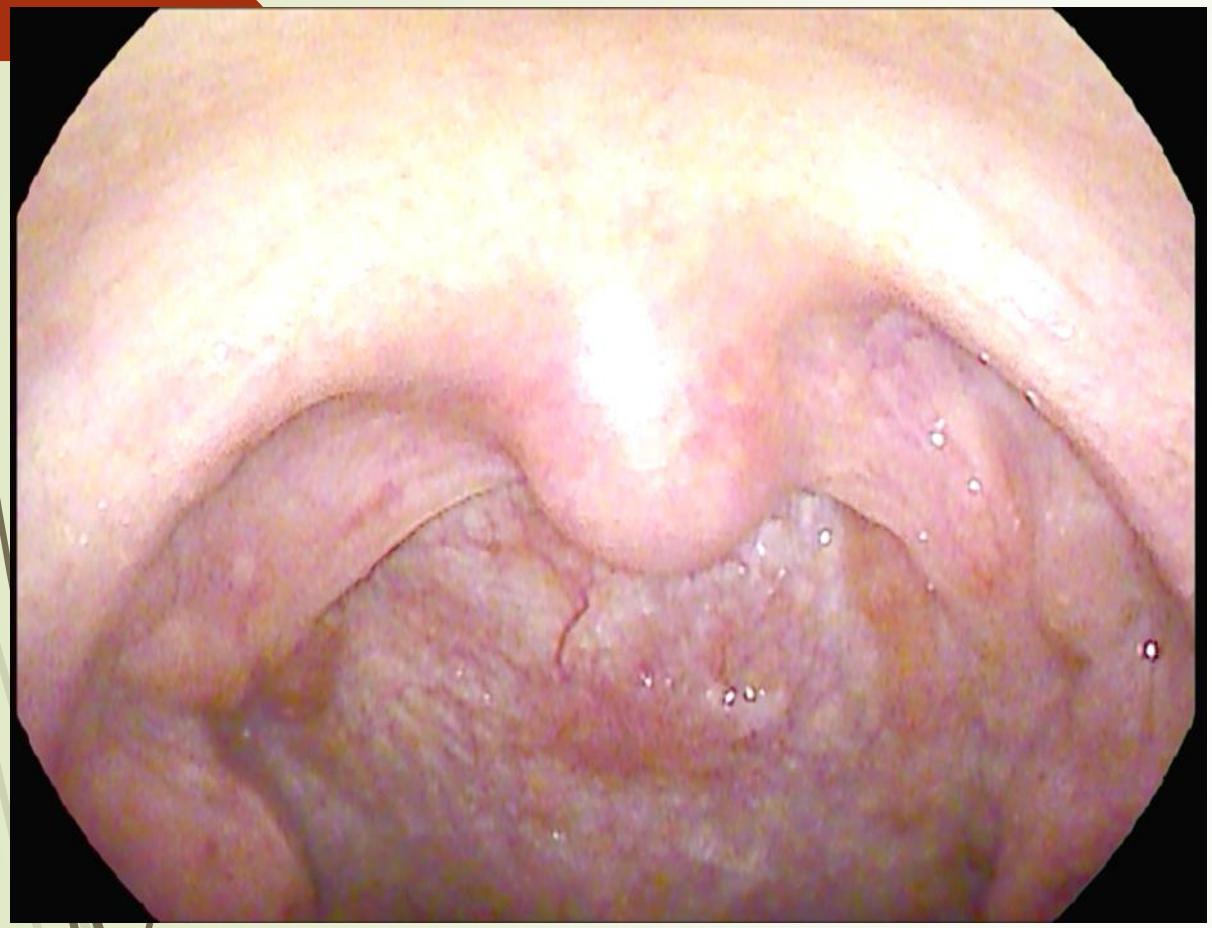
Cough + globus Sx
->laryngopharyngeal reflux (LPR)

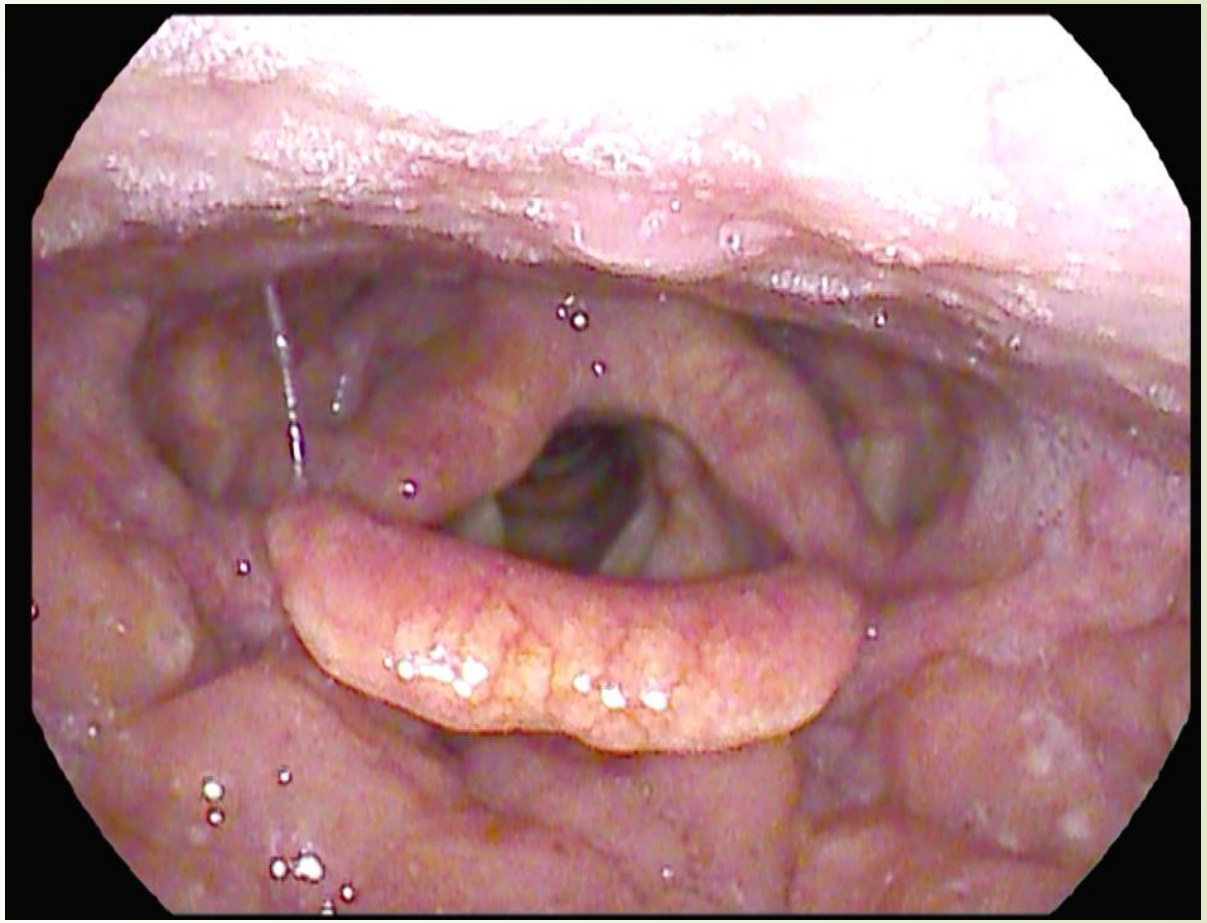
3-2. laryngopharyngeal reflux (LPR)

Symptoms						
Within the last MONTH, how did the following problems affect you?	0 = no problem 5 = severe problem					
1. Hoarseness or a problem with your voice	0	1	2	3	4	5
2. Clearing your throat	0	1	2	3	4	5
3. Excess throat mucus or postnasal drip	0	1	2	3	4	5
4. Difficulty in swallowing food, liquids or pills	0	1	2	3	4	5
5. Coughing after you ate or after lying down	0	1	2	3	4	5
6. Breathing difficulties or choking episodes	0	1	2	3	4	5
7. Troublesome or annoying cough	0	1	2	3	4	5
8. Sensations of something sticking in your throat or a lump in your throat	0	1	2	3	4	5
9. Heartburn, chest pain, indigestion or stomach acid coming up	0	1	2	3	4	5
Total						

Reflux Finding Score (RFS).	
Subglottic edema	0 = absent
	2 = present
Ventricular	2 = partial
	4 = complete
Erythema/hyperemia	2 = arytenoids only
	4 = diffuse
Vocal fold edema	1 = mild
	2 = moderate
	3 = severe
	4 = polypoid
Diffuse laryngeal edema	1 = mild
	2 = moderate
	3 = severe
	4 = obstructing
Posterior commissure hypertrophy	1 = mild
	2 = moderate
	3 = severe
	4 = obstructing
Granuloma/granulation tissue	0 = absent
	2 = present
Thick endolaryngeal mucus	0 = absent
	2 = present

3-3. Head and neck disease



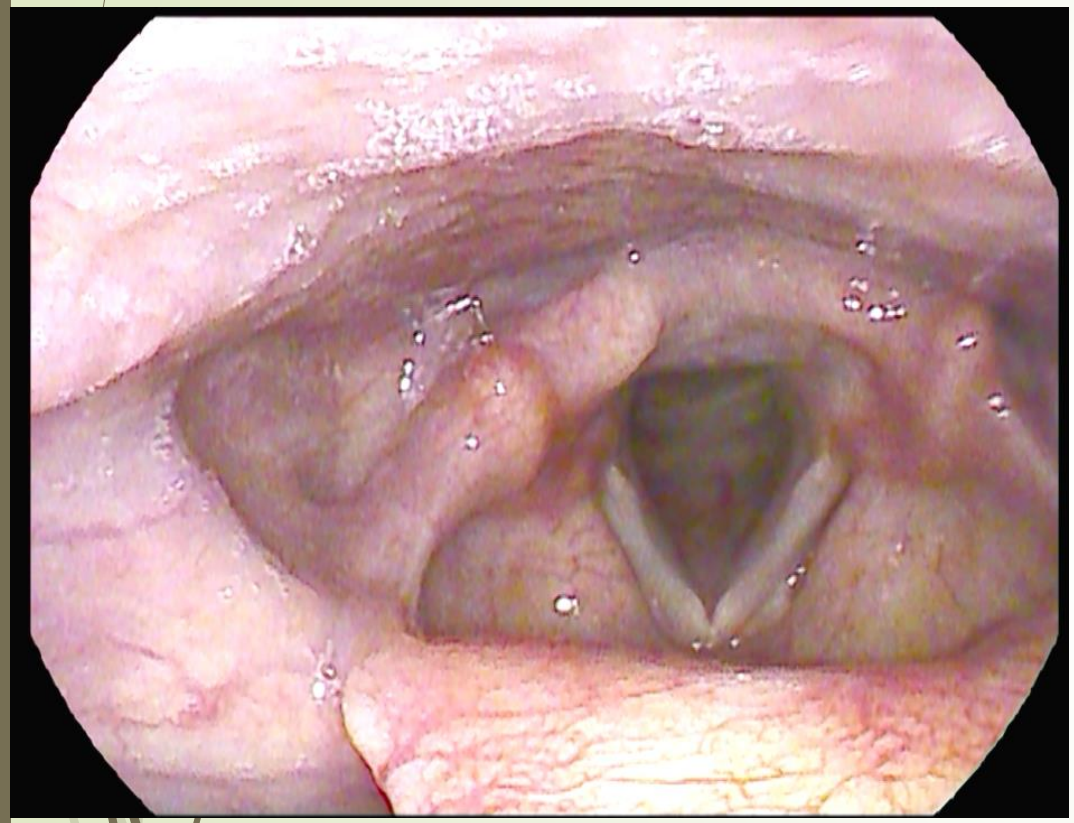


Cough + globus Sx

3-3. Head and neck disease

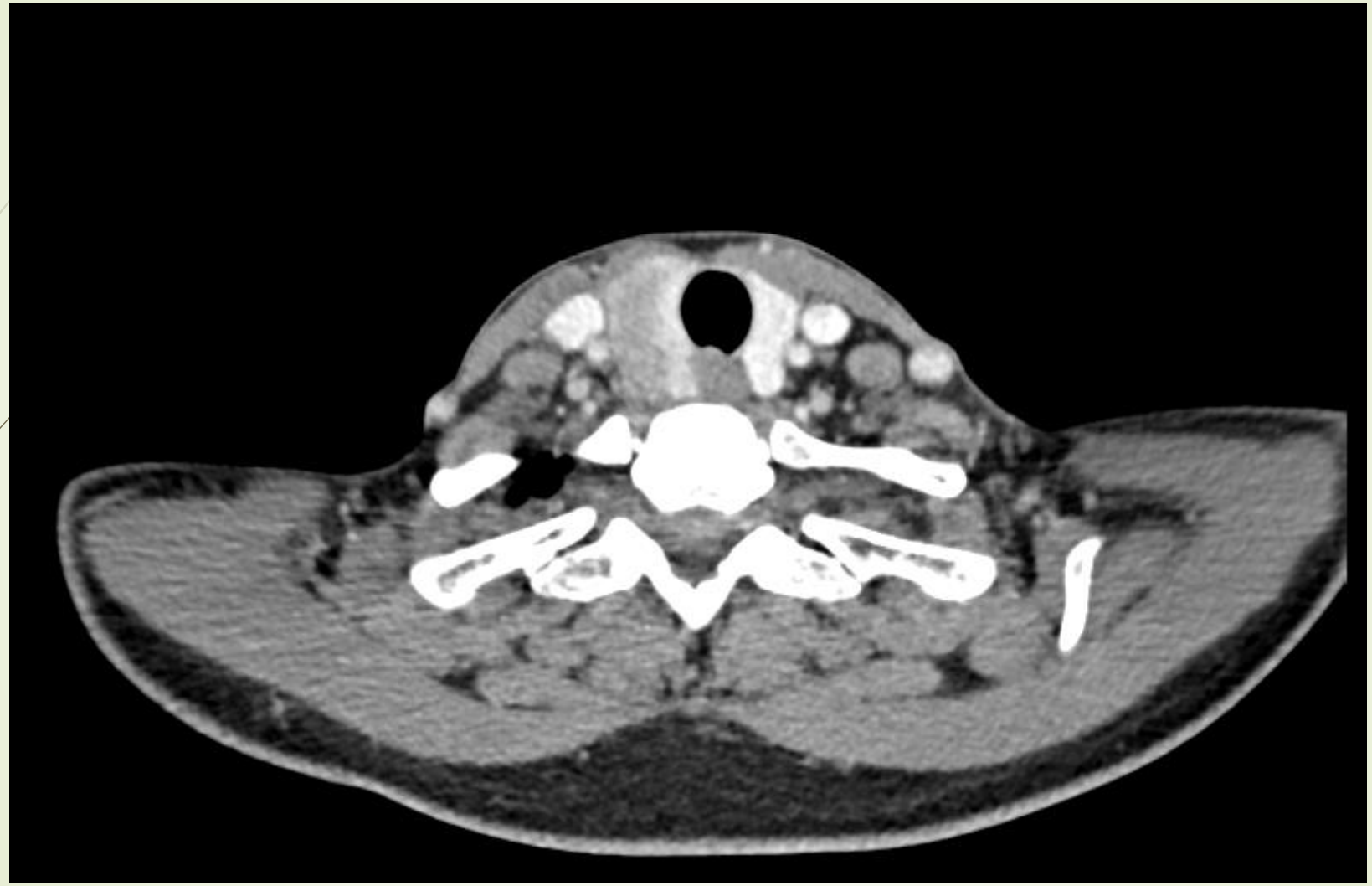
Cough + globus Sx
tonsilolith

3-3. Head and neck disease



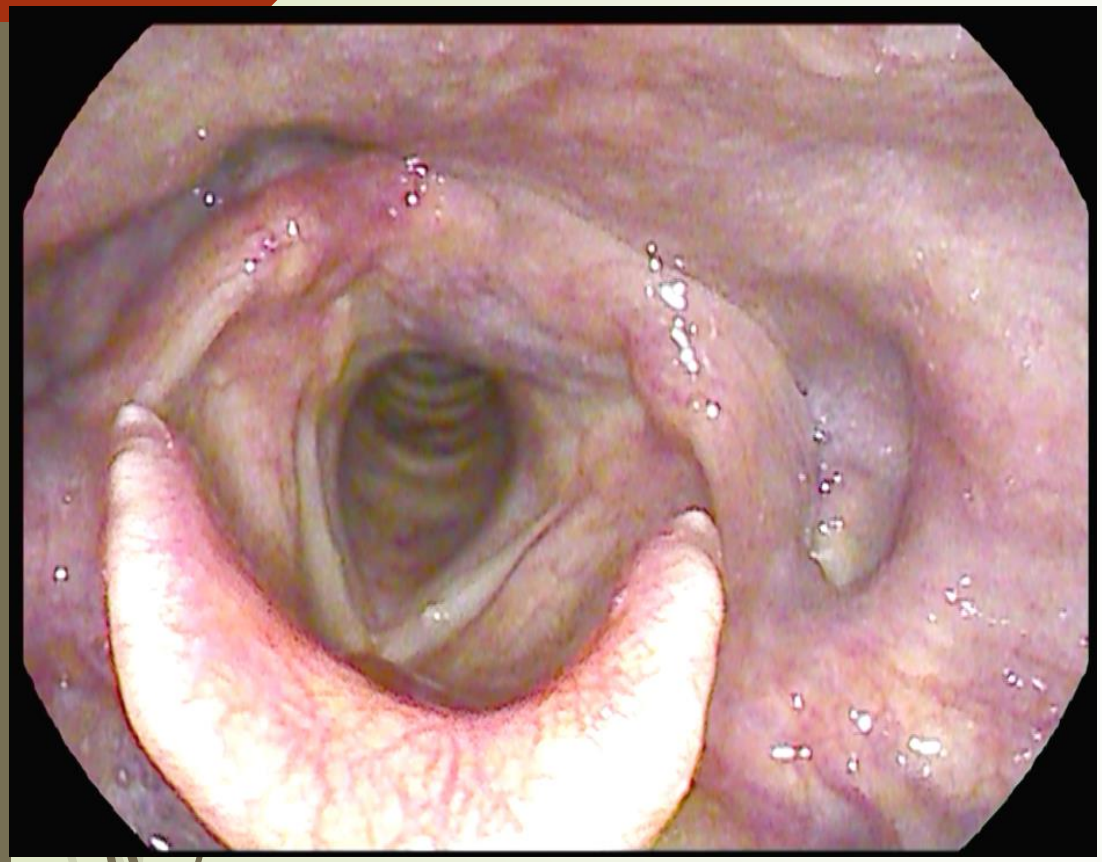
Neck pain +Cough + globus Sx

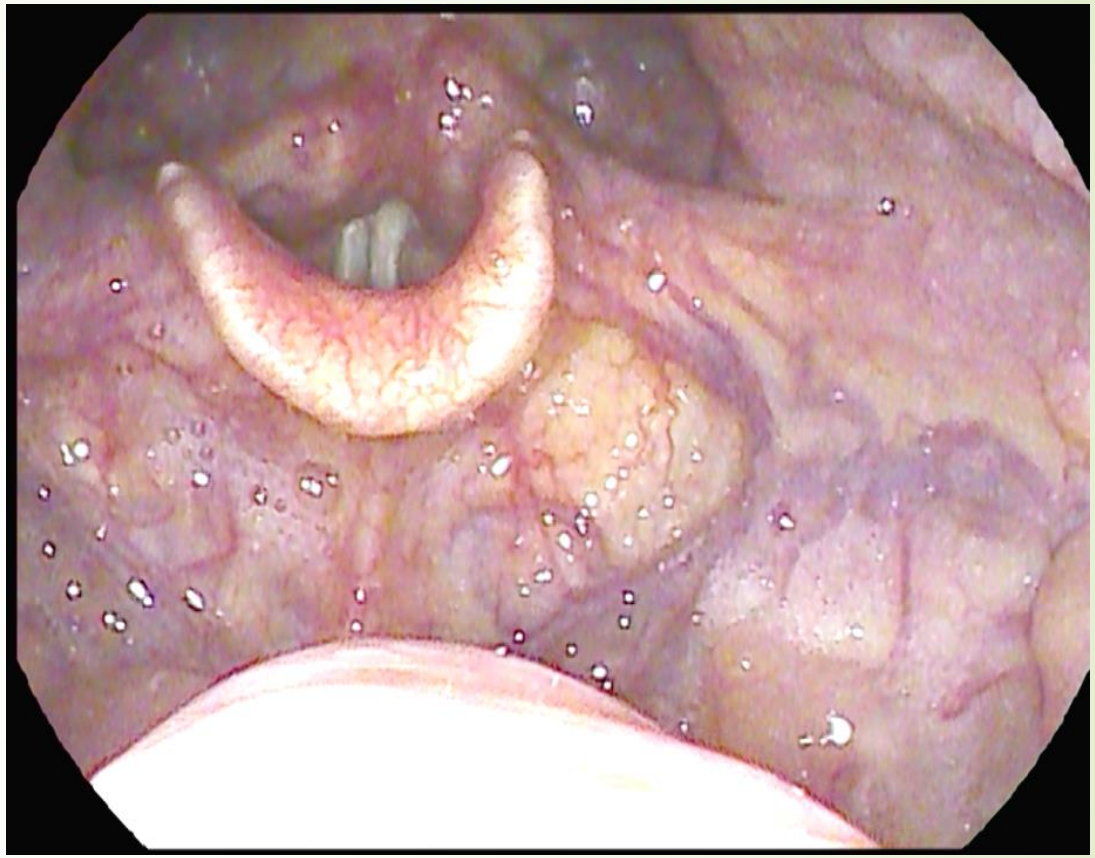
3-3. Head and neck disease



Neck pain +Cough + globus Sx
-> acute thyroiditis

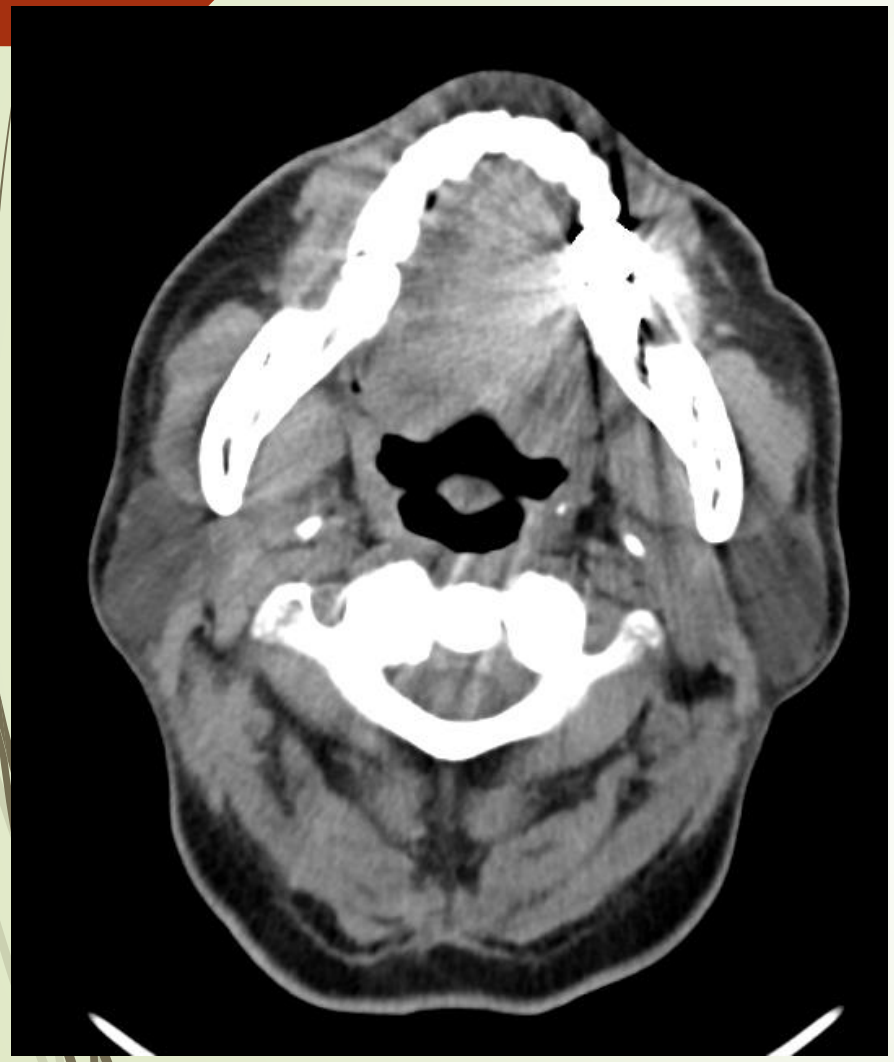
3-3. Head and neck disease

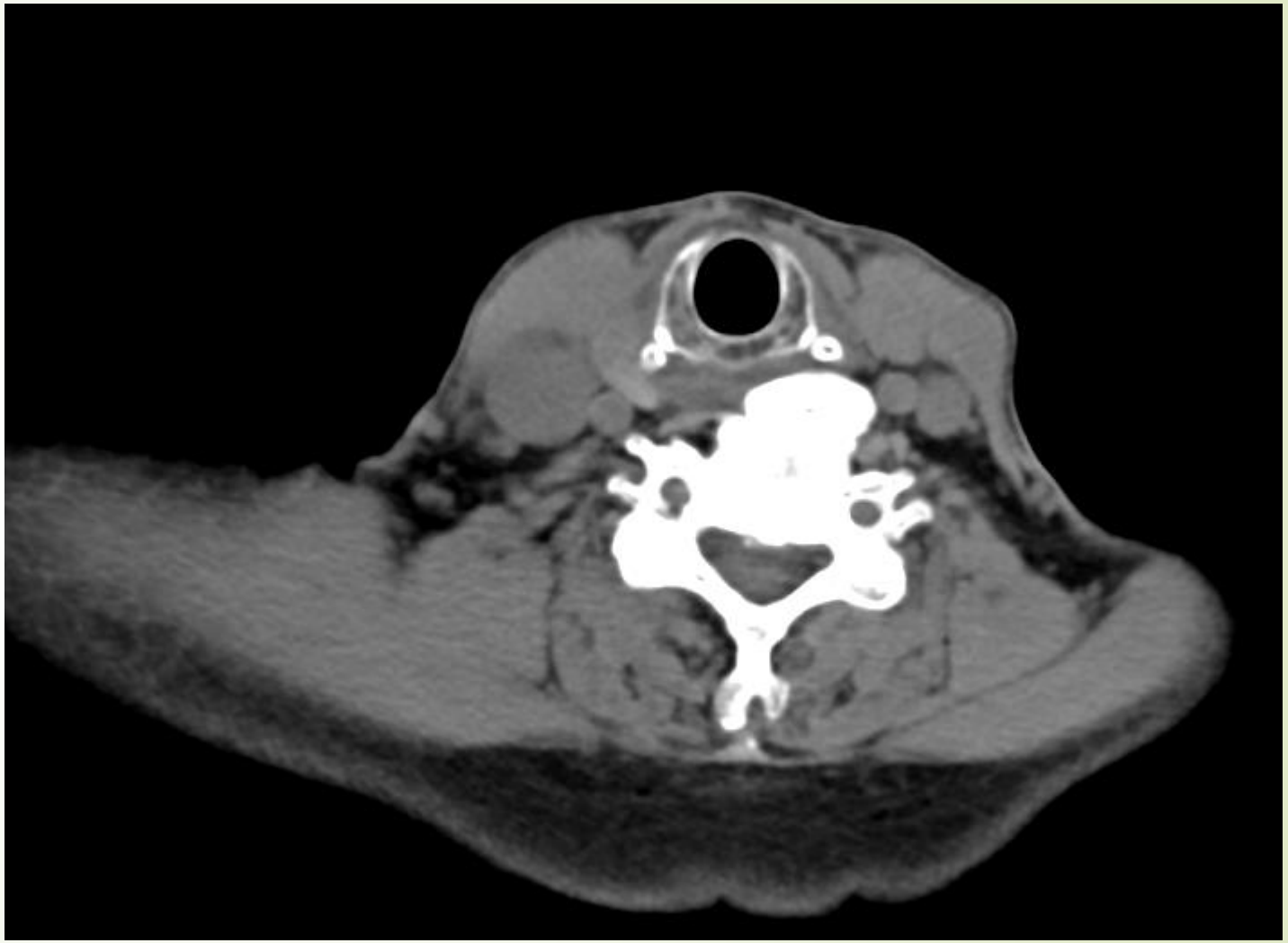




Cough + globus Sx

3-3. Head and neck disease





Cough + globus Sx
-> tonsilolith + vertebra deviation

4. Voice therapy

- Voice therapy

  여러 가지 음성장애나 음성 수술 후, 갑상선 수술 후 음성 회복을 위해 음성치료사가 전문적으로 시행하는 치료법

  : 음성 위생, 음성 교육

- 음성이 좋아지도록 하는 치료 = larynx 에 도움이 되는 치료

  cough에도 좋아지지 않을까?

4. Voice therapy

Efficacy of speech pathology management for chronic cough: a randomised placebo controlled trial of treatment efficacy

A E Vertigan, D G Theodoros, P G Gibson, A L Winkworth

Thorax 2006;**61**:1065–1069. doi: 10.1136/thx.2006.064337

See end of article for authors' affiliations

Correspondence to: Ms A Vertigan, Speech Pathology, John Hunter Hospital, Locked Bag 1, Hunter Region Mail Centre, NSW 2310, Australia; anne.vertigan@hnehealth.nsw.gov.au

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Published Online First 14 July 2006

Background: Chronic cough that persists despite medical treatment may respond to speech pathology intervention, but the efficacy of such treatment has not been investigated in prospective randomised trials. The aim of this study was to determine the efficacy of a speech pathology intervention programme for chronic cough.
Methods: A single blind, randomised, placebo controlled trial was conducted in 87 patients with chronic cough that persisted despite medical treatment. Patients were randomly allocated to receive either a specifically designed speech pathology intervention or a placebo intervention. Participants in both groups attended four intervention sessions with a qualified speech pathologist.
Results: Participants in the treatment group had a significant reduction in cough (8.9 to 4.6, $p<0.001$), breathing (7.9 to 4.7, $p<0.001$), voice (7.3 to 4.6, $p<0.001$) upper airway (8.9 to 5.9, $p<0.001$) symptom scores and limitation (2.3 to 1.6, $p<0.001$) ratings following intervention. There was also a significant reduction in breathing (6.8 to 5.6, $p=0.047$), cough (7.6 to 6.3, $p=0.014$), and limitation (2.3 to 2.0, $p=0.038$) scores in the placebo group, but the degree of improvement was significantly less than in the treatment group ($p<0.01$). Clinical judgement of outcome indicated successful ratings in 88% of participants in the treatment group compared with 14% in the placebo group ($p<0.001$).
Conclusion: Speech pathology is an effective management intervention for chronic cough which may be a viable alternative for patients who do not respond to medical treatment.

- Voice therapy

1) education about nature of cough
2) strategies to control cough
3) psycho-educational counselling
4) vocal hygiene

Vertigan AE, Theodoros DG, Gibson PG, Winkworth AL. Efficacy of speech pathology management for chronic cough: a randomised placebo controlled trial of treatment efficacy. Thorax. 2006 Dec;61(12):1065-9. doi: 10.1136/thx.2006.064337. Epub 2006 Jul 14. PMID: 16844725; PMCID: PMC2117063.

4. Voice therapy

- Voice therapy

1. 음성위생(습포법, 물많이 마시기 강조)
2. 기침줄이기 (침삼키기, effortful swallowing)
3. 호흡 (복식호흡 연습, mouth breathing 금지)
4. 목에 힘주고 발성 및 음성치료

4. Voice therapy

Table 6 Comparison of clinical judgement of outcome of the intervention between treatment and placebo groups (χ^2 test)

Outcome	Treatment (N=43)	Placebo (N=44)	p value
Successful	38	6	<0.001
Unsuccessful	2	35	
Partially successful	3	3	

Vertigan AE, Theodoros DG, Gibson PG, Winkworth AL. Efficacy of speech pathology management for chronic cough: a randomised placebo controlled trial of treatment efficacy. Thorax. 2006 Dec;61(12):1065-9. doi: 10.1136/thx.2006.064337. Epub 2006 Jul 14. PMID: 16844725; PMCID: PMC2117063.

Conclusion

- 외이도 (external auditory canal)에 vagus nerve의 branch 가 있고, cough 와 연관이 있다.
- PNS x-ray는 waters, Caldwell. PNS lat.까지 찍으면 4개 sinus 정보를 얻을 수 있다.
- Sinus x-ray 가 괜찮아도 rhinitis나 nasopharyngitis 등이 있을 수 있다.
- Globus Sx 과 cough 가 같이 있을 때는 여러 원인이 있고, laryngoscope이 큰 도움이 된다.
- Voice therapy에 관한 많은 연구가 필요하다.

감사합니다