

Minimally Invasive and Novel Therapeutics in Foregut Disease (September 29-October 1 2022)

A to Zenkers Diagnosis and Management

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HARVARD
MEDICAL SCHOOL

Zenkers Diverticulum Anatomy

- Outpouching in the posterior hypopharynx (Killian's triangle)
- Killian's triangle is an area of weakness through the transverse fibers of the cricopharyngeus muscle and oblique fibers of the thyropharyngeus muscle
- Opening of UES involves relaxation of CP and TP muscles and forward movement of the larynx. Inability of the sphincter to open leads to difficulty in swallowing. Opening of the sphincter without associated CP relaxation leads to formation of **cricopharyngeal bar**



Zenkers Diverticulum

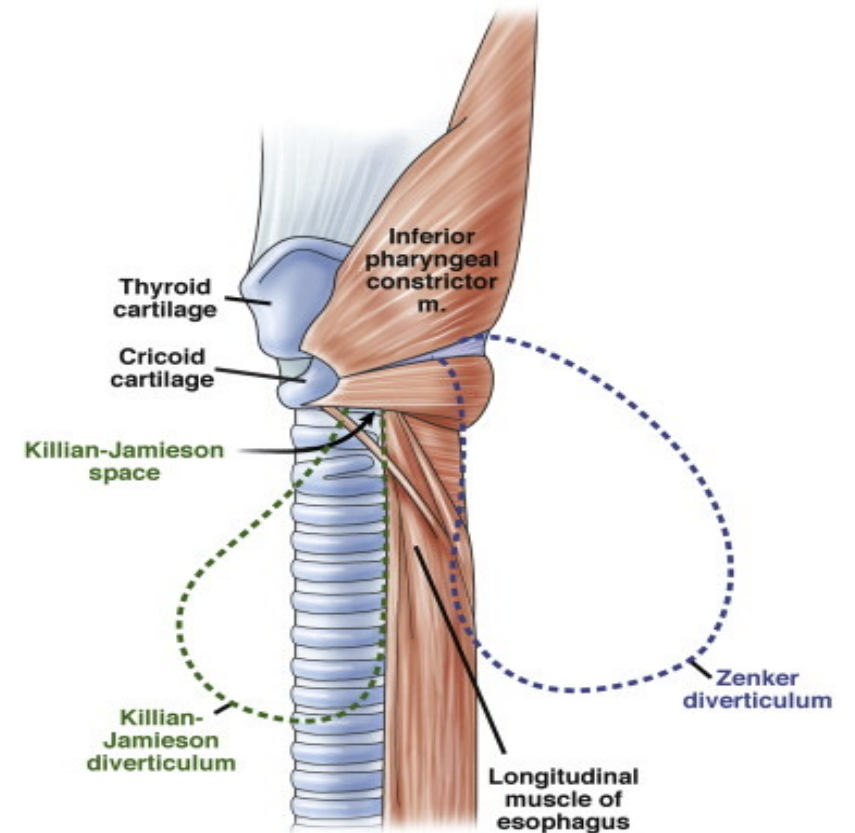
Anatomy and Etiology

Inferior pharyngeal constrictor muscles

Cricopharyngeus originates from the cricoid cartilage that plays a role in protecting refluxate from aspirating in the airway

Thyropharyngeus originates from the thyroid cartilage and inserts into the median pharyngeal raphe

Etiology is unknown however likely secondary to weakening of esophageal mucosa with increase in UES pressure. The increase in pressure during swallowing pushes esophageal tissue layers outside the esophagus forming a pouch. Increase in pressure of the cricopharyngeal muscle results in decreased UES relaxation and further increase in pressure in the UES.

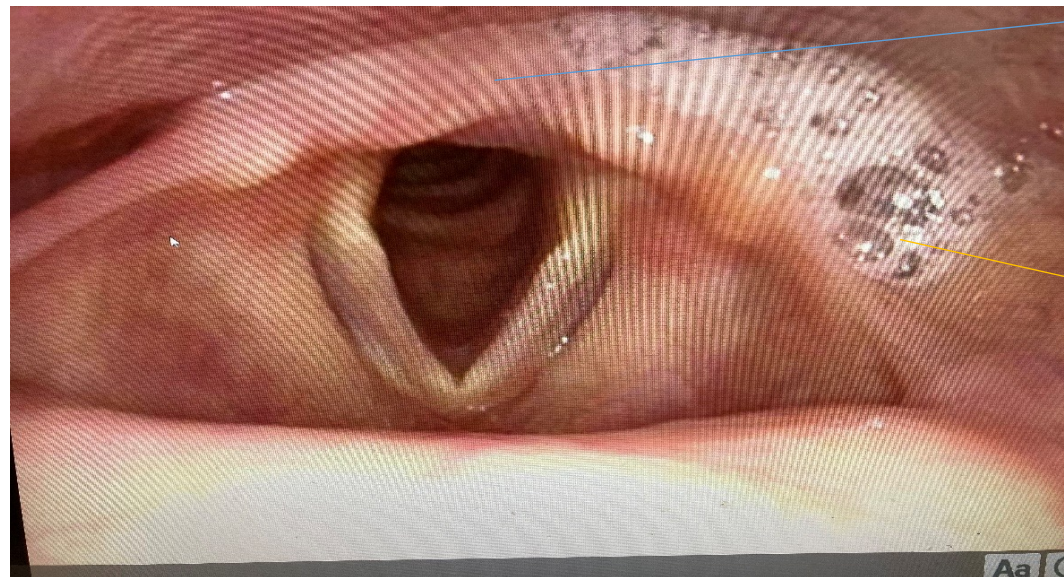


Left lateral view

Zenkers Diverticulum

Anatomy and Exam findings

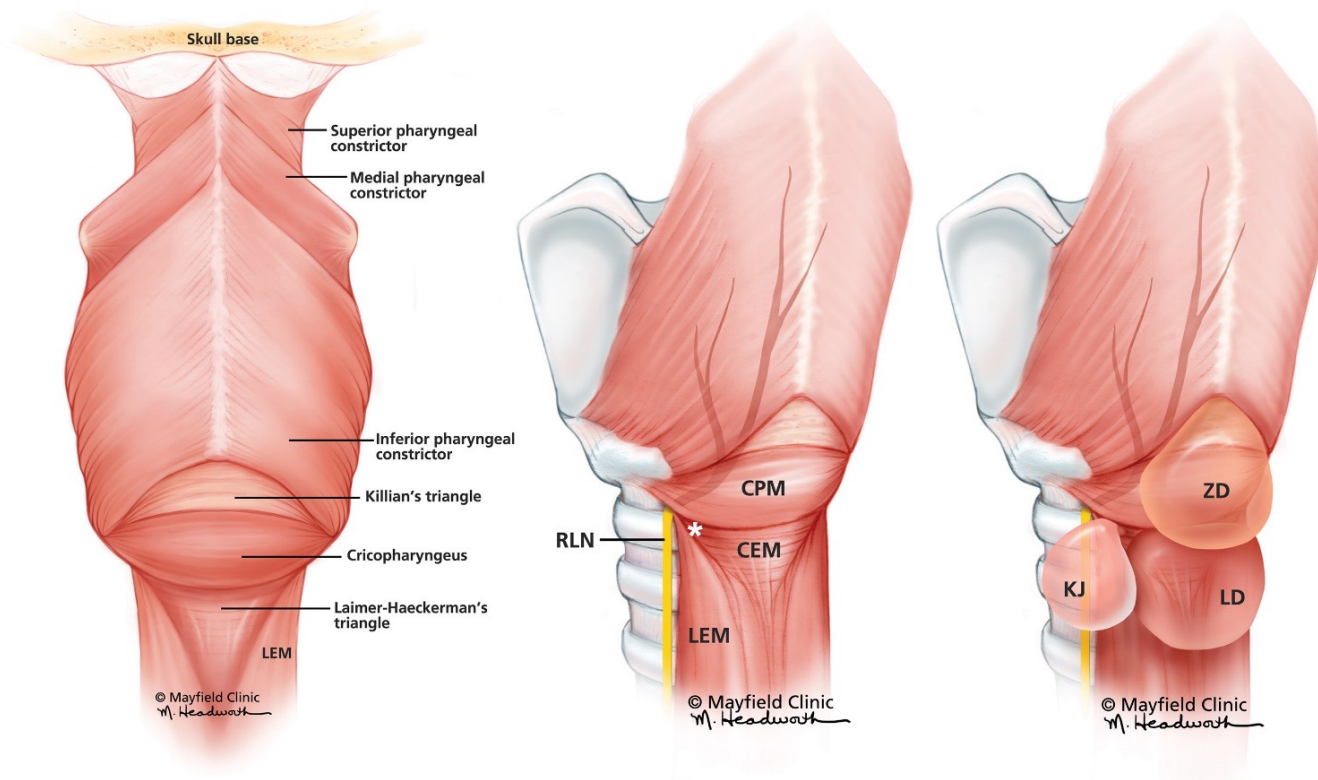
- Nasolaryngoscopy exam findings can include: pooling of secretions within the piriform sinuses, gurgling and regurgitation with palpation of neck swelling if present
- Zenkers diverticulum is not visible on nasolaryngoscopy
- Cricoid cartilage is at level of C6



Post cricoid region

Pooling of secretions within Piriform sinus

Zenkers Diverticulum Anatomy



Zenkers diverticulum (ZD) btw cricopharyngeus and inferior constrictor

Killian Jamieson diverticulum (KJ) btw cricopharyngeus and lateral wall of the proximal cervical esophagus. It originates in an area of anatomic weakness Killian Jamieson space

Laimers diverticulum (LD) inferior to the cricopharyngeus in the posterior midline in Laimer's triangle, located in the posterior aspect of the esophagus covered by esophageal muscle

Zenkers Diverticulum Epidemiology

- Prevalence approximately 0.01-0.11% of population
- More common in males than females (approx. ratio 1.5:1.0)
- Most commonly occurs in older adults 60-80s

Zenkers Diverticulum

Differential diagnosis

- Reflux disease
- Cricopharyngeal achalasia UES does not relax with swallowing
- Esophageal stricture
- Esophageal carcinoma
- Esophageal spasm
- Killian Jamieson diverticulum rare, usually on the left side
- Laimer's diverticulum very rare; esophageal dysmotility may be contributory

Zenkers Diverticulum

Clinical Presentation

- **Dysphagia with solids most common symptom in at least 80-90% citation. Secondary to incomplete relaxation of UES and extrinsic compression of ZD**
- **Regurgitation of retained food**, unintentional weight loss, aspiration, halitosis, globus sensation
- Chronic cough
- Boyce's sign is rare; have gurgling with palpation of neck swelling
- Small diverticulum less than 1.0 cm likely are asymptomatic

Zenkers Diverticulum Complications

- Aspiration pneumonia
- Fistula between Zenkers and trachea
- Ulceration and bleeding can occur with pill dysphagia
- Squamous cell carcinoma in Zenkers is rare between 0.3-7%
citation (can have blood tinged regurgitated food)

Zenkers Diverticulum Clinical Presentation

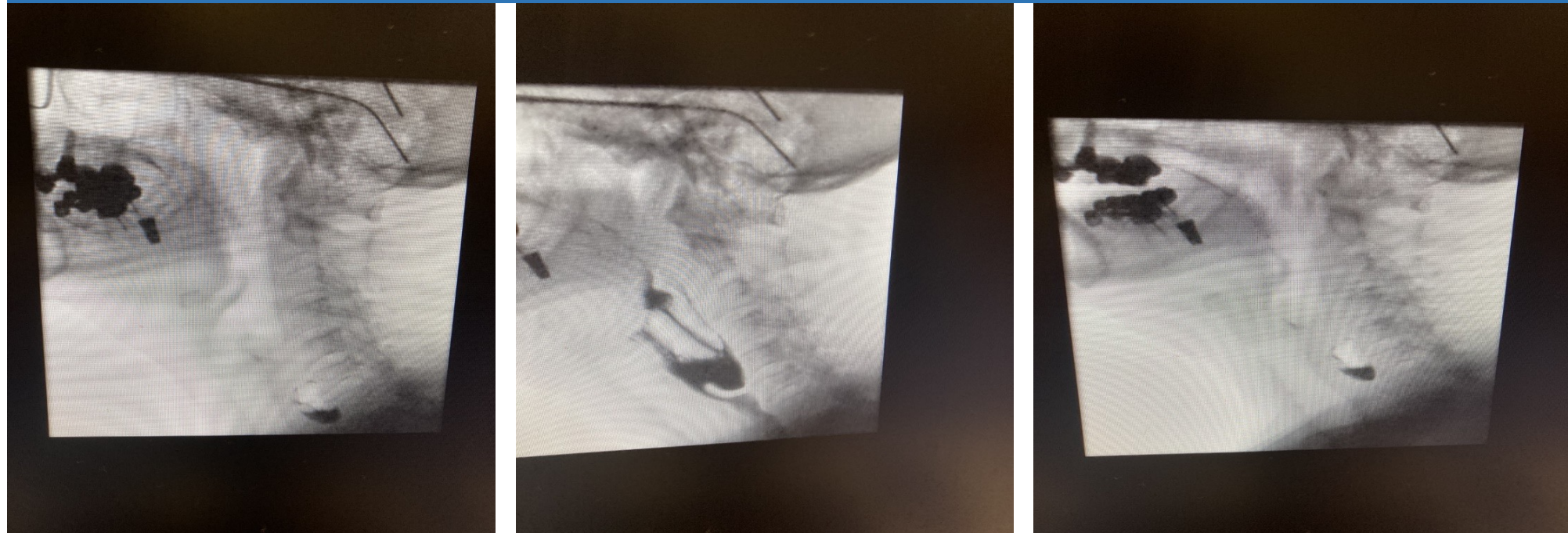
- **Zenkers more prevalent on the left than on the right side**
- “There was a significant difference in muscle thickness between the left and right sides of Killian's dehiscence. The average left muscle layer was significantly thinner than the right muscle layer, in both medial and lateral aspects. The findings suggest there is a reason why Zenker's diverticulum occurs predominantly on the left side. The study also showed a significant difference in muscle thickness between the medial and lateral aspects of Killian's triangle”
- **“Why do Zenker's diverticulae occur more often on the left than the right side? “ [N A Fitchat](#)¹, [S Maharaj](#)¹, [M O Kwete](#)¹ Journal of Laryngology and Otology June 2019**

Zenkers Diverticulum Evaluation

Most common studies

Barium swallow

Zenkers diverticulum usually found between C5-C6



Zenkers Diverticulum Evaluation

- **Modified barium swallow**
- Upper endoscopy (EGD) can cause esophageal perforation in pts with ZD
- FEES
- High resolution manometry

Zenkers Diverticulum

Treatment options

- Symptoms indicating patient may benefit from intervention: Worsening dysphagia, avoidant of certain foods, aspiration pneumonia, unintentional weight loss
- Small Zenkers 1 cm or less usually monitor
- Medium Zenkers greater than 2 cm
- Large Zenkers diverticulum greater than 5 cm

Zenkers Diverticulum

Treatment options

- Balloon dilation and Rigid Endoscopic CP myotomy with CO2 laser and/or stapling- complications can include tongue numbness, change in taste, RLN injury, inc in reflux, need for revision surgery
- Open approach CP myotomy- mediastinitis, fistula, subcutaneous emphysema, bleeding
- Per oral endoscopic myotomy (POEM)
- If CP achalasia also present could do balloon dilation with Botox injection

Zenkers Diverticulum Treatment options

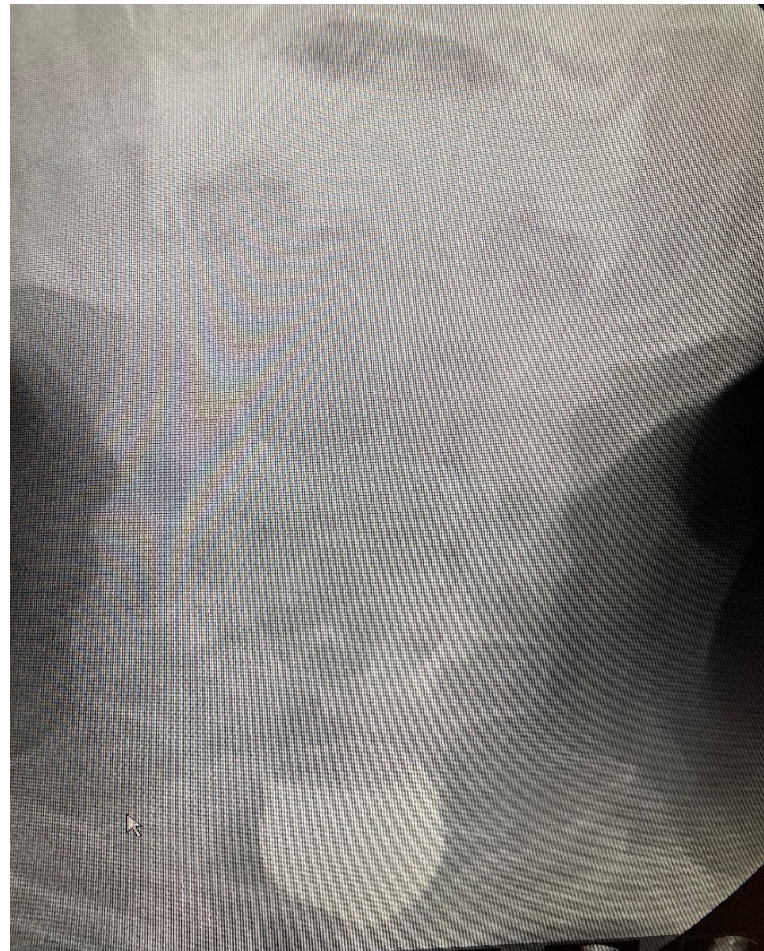
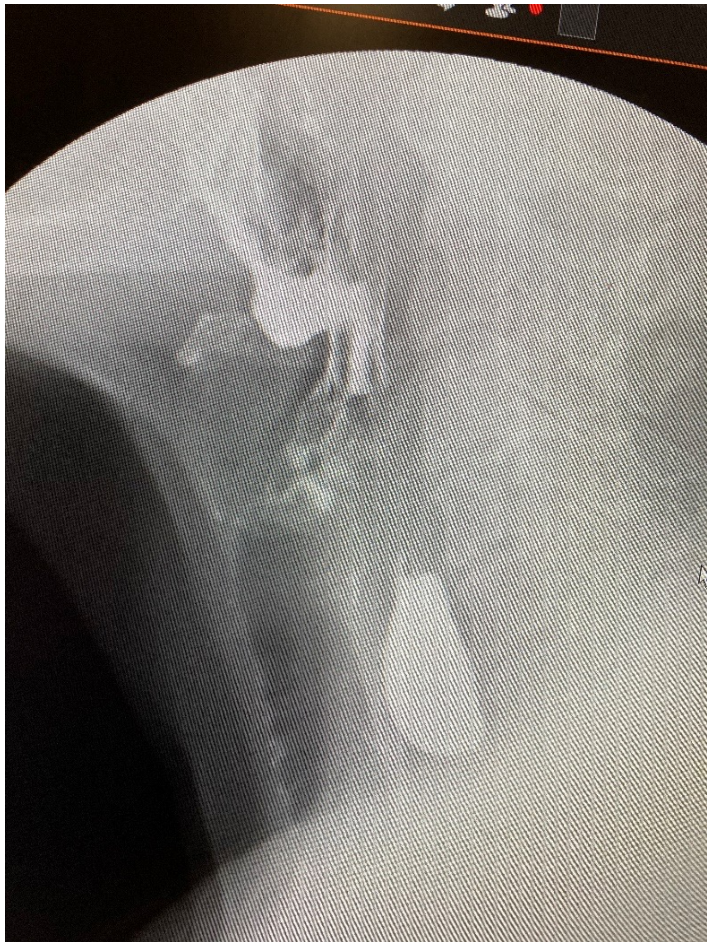
Surgical management considerations

- Zenkers less than 3 cm difficult to perform endoscopic stapling
- Zenkers 3-6 cm can perform endoscopic surgery
- Zenkers diverticulum > 6cm cannot perform endoscopically
- Small jaw opening, cervical arthritis, TMJ, history of difficulty with anesthesia may not be good surgical candidate for rigid endoscopy approach
- **Important to have a collaborative approach in regards to determining optimal treatment options for each individual**

Zenkers Diverticulum Case Presentation

- 81 y/o female hx of reflux, esophageal dysmotility, CP achalasia
- Dysphagia with solids meats, greens, dry foods, pills, cough. 60 lb weight loss over past 4-5 years. Would drink liquids to assist in swallowing
- Evaluated with barium swallow in 2021: Zenkers 4.2x 2.0x 2.7cm, moderate hiatal hernia
- On Omeprazole 20 mg before meals

Zenkers Diverticulum Case presentation



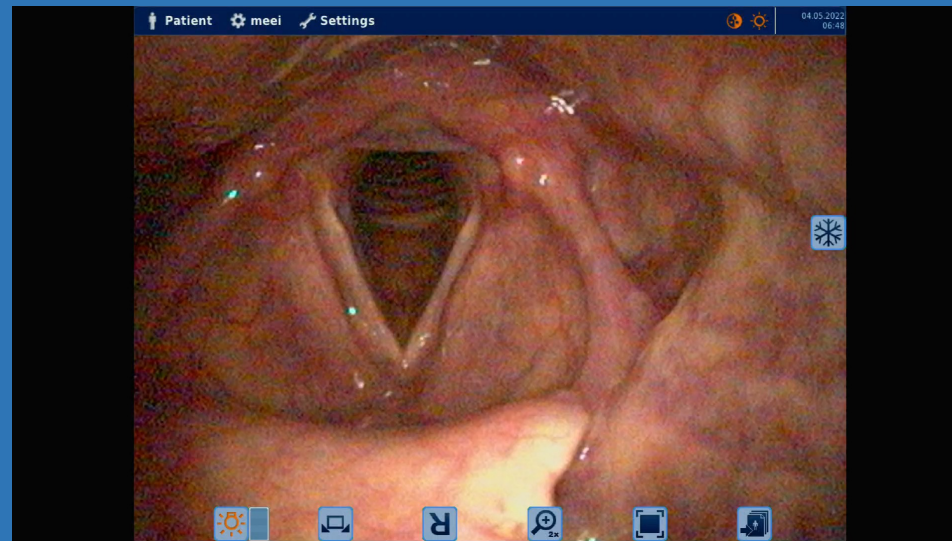
Zenkers Diverticulum

Case presentation

- Was seen in follow up in May 2022 and reported worsening dysphagia, cough and regurgitation over past few months
- Has to chew food more thoroughly, takes longer to eat meals
- Discussed surgical options:
 1. Balloon dilation, Botox injection of CP
 2. Endoscopic approach CP myotomy with CO2 laser or stapling
 3. Open neck approach

Zenkers Diverticulum Case presentation

nasolaryngoscopy exam 5/4/22



Zenkers Diverticulum Case presentation

- The patient underwent Endoscopic stapling and CO2 laser June 2022



Zenkers Diverticulum Case presentation



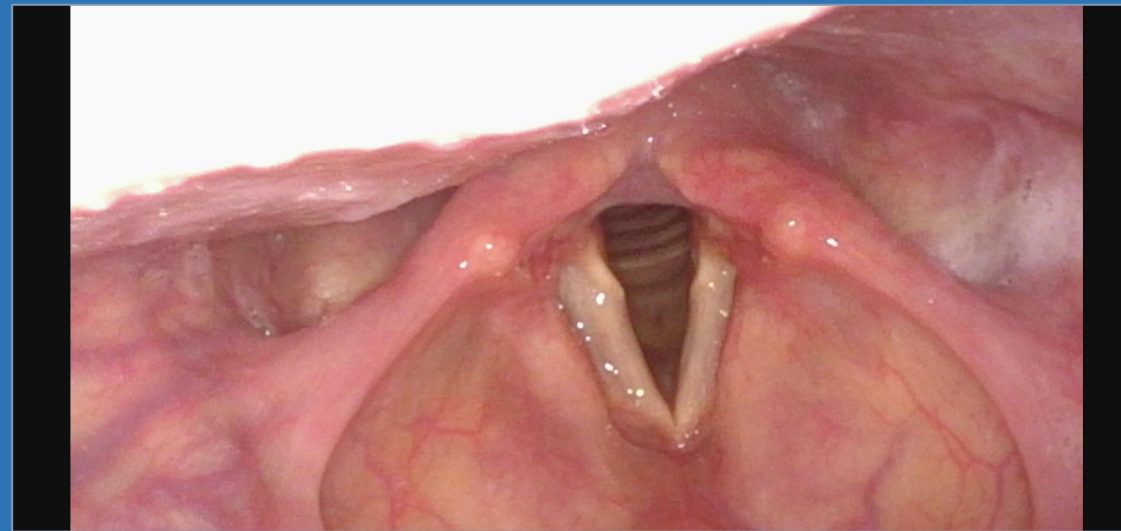
Zenkers Diverticulum Case presentation

Patient was seen for 2 week post op check

- Patient was admitted overnight and had Post op BS which revealed no evidence of contrast leak, moderate hiatal hernia, esophageal dysmotility
- On liquid diet x 1 week
- Notes dec in cough, throat clearing, choking episodes
- Advance diet to pureed soft x 1 week and can continue to advance diet as tolerated

Zenkers Diverticulum Case presentation

Nasolaryngoscopy post op exam 6/14/22



Zenkers Diverticulum

Clinical Pearls

- Most common esophageal diverticulum
- Outpouching of mucosa through Killian's triangle, an area of weakness between the oblique fibers of inferior constrictor and the transverse fibers of the CP
- Most common symptoms: Dysphagia with solids, regurgitation of retained foods, cough
- Evaluation with barium swallow or modified barium swallow
- Most common in elderly 60-90s
- Much more common on the left side
- Observation versus Surgical management: Endoscopic CP myotomy, open neck CP myotomy, balloon dilation, POEM
- Multidisciplinary collaboration is key to providing optimal patient care

Zenkers Diverticulum References

- PERSPECTIVES IN CLINICAL GASTROENTEROLOGY AND HEPATOLOGY | [VOLUME 12, ISSUE 11](#), P1773-1782, NOVEMBER 01, 2014

Zenker's Diverticulum [Ryan Law](#) [David A. Katzka](#) [Todd H. Baron](#)

- Published: September 19, 2013 DOI: <https://doi.org/10.1016/j.cgh.2013.09.016>
- Hajjar WM, Almutairi OT, Jameel MA, Al-Nassar SA, Raddaoui E, Hajjar AW. Squamous Cell Carcinoma Arising in Zenker's Diverticulum: A Case Report and Review of the Literature. Turk Thorac J. 2018 Jun 19;19(4):228-230. doi: 10.5152/TurkThoracJ.2018.17082. PMID: 30407159; PMCID: PMC6196899.
- Alnimer L, Zakaria A, Piper M. Killian Jamieson Diverticulum: A Rare Cause of Dysphagia. Cureus. 2021 Mar 2;13(3):e13654. doi: 10.7759/cureus.13654. PMID: 33824805; PMCID: PMC8012179.
- https://www.researchgate.net/publication/270218541_Laimer's_Diverticulum_A_Rare_True_Diverticulum_Inferior_to_the_Cricopharyngeus_Report_of_a_Case_and_Review_of_the_Literature_Citation
- Goyal, Raj, Sivarao, DV Functional anatomy and physiology of the upper esophageal sphincter The American Journal of Medicine
- Fitchat NA, Maharaj S, Kwete MO. Why do Zenker's diverticulae occur more often on the left than the right side? J Laryngol Otol. 2019 Jun;133(6):515-519. doi: 10.1017/S0022215119001051. Epub 2019 Jun 3. PMID: 31155021.
- Nesheiwat Z, Antunes C. Zenker Diverticulum. [Updated 2022 May 21]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK499996/>

Zenkers Diverticulum

Questions

1. What other imaging modality is utilized if patient cannot swallow barium?

Ultrasound can be utilized however Zenkers diverticulum can be mistaken for a thyroid nodule.

2. Is Zenkers diverticulum a true diverticulum?

It is a pseudo or false diverticulum as it involves the mucosa and submucosa and not the muscularis externa