Objects

- To outline the epidemiology and pathophysiology of ZD
- To introduce the various treatment options
- To introduce endoscopy as a viable alternative therapy for ZD

Zenker’s Diverticulum

- 1767 - first described by Ludlow
- 1877 - 23 patients reported by Zenker and von Ziemssen
- 1995 - Flexible endoscopic treatment first described

Zenker’s Diverticulum

- Annual Incidence: 2: 100,000
- Prevalence: 1: 1,000 – 1: 10,000
- 1: 1000 UGI series
- 2 times more common in males
- Typically 7th – 8th decade
- Rare in Africa and Asia
- More frequent in Northern Europe

Bizzotto A et al. Acta Otorhinolaryngol Ital 2013
Definition

• Zenker’s Diverticulum is a sac-like mucosal outpouching of cervical esophagus through the Killian triangle
• Pulsion hypopharyngeal false diverticulum made up of mucosa and submucosa

Zenker’s Diverticulum

Killian’s triangle is an area of weakness which is not supported by constrictor muscles
ZD is a posterior pharyngeal pouch with the neck proximal to the cricopharyngeus muscle
Increased luminal pressure force the tissues through the weak spot.
Pathophysiologic abnormalities of the cricopharyngeus

Zenker’s Diverticulum: Presenting Symptoms

• Dysphagia
• Regurgitation
• Choking
• Sensation of a lump in the throat
• Aspiration
• Voice changes
• Chronic cough
• Halitosis
• Weight loss and malnutrition

Zenker’s Diverticulum – Complications

• Squamous cell carcinoma: 0.4 – 1.5%
• Ulceration
• Bleeding
• Aspiration pneumonia
• Unpredictable absorption of medication
• M2A capsule retention
• Difficulties with tracheal intubation, ERCPs, EGDs, TEE, NG tubes
• Perforation
Zenker’s Diverticulum

Zenker’s Bridge:
- septum between the diverticulum and the esophageal lumen
- consists of mucosa, submucosa, connective tissue and a muscle layer

Laterally displaced variant (Killian-Jamieson’s diverticulum)

Bilobed diverticulum

Zenker’s Diverticulum

Treatment

- Small asymptomatic or minimally symptomatic --- follow
- Open surgical procedures (esp. if > 5 cm)
  - Resection (Diverticulectomy) - large diverticula
  - Inversion - medium size
  - Suspension (Diverticulopexy) - medium size
  - always includes cricopharyngeal myotomy
- Complications:
  - leaks with mediastinitis
  - esophagocutaneous fistula
  - recurrent laryngeal nerve injury
  - parapharyngeal abscess

Results of Open Surgery

- Mayo Clinic: 888 patients
- Excellent or good outcome: 93 %
- Complication rate: 30 %
- Mortality: 3 %
- Mean Recurrence: 5 %

Bizzotto A et al. Acta Otorhinolaryngo Ital 2013
Zenker’s Diverticulum Treatment

- **Endoscopic Techniques:**
  - Endoscopic stapling diverticulotomy
  - Endoscopic CO₂-laser myotomy
  - Endoscopic harmonic scalpel diverticulotomy

Before and After

- **Zenker’s Diverticulum Treatment**
  - **Endoscopic Techniques:**
    - Rigid diverticuloscopes
Zenker’s Diverticulum Treatment

• Endoscopic Techniques:
  Rigid diverticuloscopes
  Surgical staplers: Predominant technique
  Good neck flexibility,
  Favourable dentition
  General anaesthesia
  Large diverticula (not for < 3 cm)
  Bleeding, perforation, leaks

Results of endoscopic stapling procedures

• Effective in 92% of cases
• Complication rate: 4%
• Mortality < 1%
• Mean recurrence rate: 12%
• Conversion to open surgery: 5%

Leong SC et al. Eur Arch Otorhinolaryngol 2012

Flexible Endoscopic Therapy

• First introduced in 1995 by C.J. Mulder (Endoscopy)
• Cap-assisted vs Diverticuloscope-assisted

Flexible Endoscopic Treatment of Zenker’s Diverticulum

• No need for GA; done in Endoscopy unit
• Possible in elderly patients with multiple comorbidities
• Generally not for diverticula > 6 cm
• Outpatient 6 hours; inpatient 24-48 hours
• Procedure time: 30 – 45 minutes
• Po after 12 hours

Flexible Endoscopic Treatment of Zenker’s Diverticulum

• Conscious sedation (midazolam+ opiates, propofol)
• Low risk
• Post-procedural air in up to 27% - Mayo Clinic
• Severe complications: rare
Flexible Endoscopic Treatment of Zenker’s Diverticulum

- Equipment:
  - Needle knife sphincterotome (APC, Hot Bx, Hook Knife, Stag Beetle knife)
  - Transparent cap
  - Diverticuloscope
  - Clips

Moncton Hospital Experience
Feb 2011 – March 2015

Pre-procedure:
- Outpatient; NPO after midnight
- CBC, electrolytes, Creat, PT/PTT, group & hold x 2 u PRBC
- iv cephalosporin (1 dose) (?)
- Chlorhexidine mouthwash

Post-procedure:
- Admit overnight
- D/C NG tube in am and start po liquids
- Home
- Telephone in 4 – 6 weeks

Moncton Hospital Experience
Feb 2011 – March 2015

- N = 19; Female 10 Male 9
- Age 51 – 93 (Median Age 78)
- Good outcome: 15
- Unknown outcome: 2
- Recurrence: 3
- Repeat procedure: 2
- Complications: 2 – both minor & treated conservatively

Endostapling versus Flexible endoscopy

- Hospital stay
- Dysphagia symptom score similar outcomes
- Complication rates
- Procedure time – longer for endostapling
- Clinical success (dysphagia score): 84 – 100 %
- Clinical recurrence rate: 20 %
- Complications: mediastinitis, cervical abscesses 4%
  microperforforation: 0 – 10 %
Endoscopic Treatment for Zenker’s Diverticulum: Long-term Results

- 150 patients treated between 2002 and 2011
- Median size was 3 cm (1-8 cm)
- Used a soft plastic diverticuloscope, cap and clips
- Propofol or general anaesthesia
- Median F/U was 43 months (13-121)
- Clinical success at one month: 90.3%
- Four adverse events – all managed conservatively (2.2%)

Huberty V et al. GIE 2013;77:701-7

Endoscopic Treatment for Zenker’s Diverticulum: Long-term Results

- Dysphagia at 1 month (103): 1.88 to .29 (p<.01)
- Dysphagia at end of F/U (134): 1.88 to .34 (p<.05)
- Regurgitation: 73% to 11%
- Chronic cough: 23% to 2%
- Symptom Recurrence in 31 pts: 23.1%

Huberty V et al. GIE 2013;77:701-7

Summary

- Zenker’s Diverticulum is uncommon and increases with age
- Diagnosis is by imaging or endoscopy
- Surgery is the most effective treatment but has higher procedure-related morbidity and hospital stay
- Flexible endoscopic treatment is safe and effective and represents a viable option vs surgery
- Flexible endoscopy is minimally invasive and most suitable for older and high risk patients
- Direct comparison between studies and results at this point is inappropriate (too many variables)
- Choice between different options depends on local expertise and preferences