SWALLOWING AFTER RADIATION: OPTIMIZING OUTCOMES

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Head and Neck Cancer Treatment

• Head and neck cancers comprise 4 to 5% of total cancer cases diagnosed yearly


• External beam radiotherapy (RT) with or without chemotherapy (CCRT)
  • Is the primary means of organ preservation treatment for many of these tumors
Radiation Therapy & Dysphagia

The upper aerodigestive tract is highly susceptible to radiation-induced injury.

Dysphagia is one of the most common side effects:

- Up to 50% of head and neck cancer patients treated with RT experience moderate to severe dysphagia that may persist months to years after therapy.
- Detrimental to Quality of Life.

- Weight loss
- Dietary Changes
- Social Isolation
- Prolonged Meal Times
- Aspiration Pneumonia
Radiation Induced Dysphagia

- **Early Onset**
  - Usually temporary
  - Edema
  - Mucositis

- **Late Onset**
  - Develops long after completion of RT
  - Chronic inflammation & Fibrosis
  - Damage to skin, connective tissue, salivary glands, nerves, muscles
  - Much more difficult to manage
Pathophysiology

- Impaired strength, timing & coordination of tongue base, hyolaryngeal complex, pharyngeal constrictors and upper esophagus
  - Swallow Therapy

- RT $\rightarrow$ stricture/stenosis of the Upper Esophageal Sphincter (UES)
  - UES = high pressure zone (Cricopharyngeus + Inferior Constrictor + upper esophagus)
    - Barrier between the pharynx and esophagus
    - It must open for swallowing, belching and vomiting

- Cricopharyngeus muscle = primary target for surgical intervention
Upper Esophageal Sphincter Dysfunction

- Poor compliance of the UES or pharyngoesophageal segment → reduced or absent opening during swallowing

- Symptoms:
  - Dysphagia – solid & liquid, localized to the neck
  - Regurgitation
  - Cough
  - Aspiration
  - Weight loss
  - Dysphonia
  - Globus
Cricopharyngeal Bar on Modified Barium Swallow
Options for treatment

1. Botulinum Toxin Injection into the Cricopharyngeus
2. Dilation of the Cricopharyngeus
   a. Bougie (rigid)
   b. Balloon
3. Cricopharyngeal myotomy (cutting the muscle)
   a. Open
   b. Endoscopic
Botulinum Toxin Injection

- Originally described 1994
- Chemodenervation $\rightarrow$ **temporary** muscle paralysis by inhibiting presynaptic release of acetylcholine
Botulinum Toxin

• Response rates 43% to 100%

• Range of reported doses 5 to 100 units
  • Recommend small volumes and high concentration
  • Injection into posterior midline CP muscle


• Administration
  • Outpatient setting via transcutaneous transcervical electromyographic guided technique
  • Operating room vis direct suspension laryngoscopy and rigid esophagoscopy
Endoscopic Dilation

• Dates back to the 17th century – Whale Bone

• Bougie dilators

• Savary dilators: fixed-diameter wire guided dilators

• Controlled radial expansion (CRE) balloons
  • Success of 65-100%, recurrence 0-50%
  • 2/3 of patients experience improvement in dysphagia for at least 2 years


• Temporary procedure for the non-fibrotic UES
  • Higher incidence of recurrence of symptoms
Endoscopic Dilation

• Can be done in the office or the operating room
  • Prefer to do first dilation in the OR

Procedure
1. Expose CP with the Dedo laryngoscope placed in the post-cricoid space just above the CP.
2. Palpate CP with thin rigid suction
3. Complete flexible esophagscopy
4. Balloon dilation with CRE esophageal balloon 18 to 20mm for 30 to 60sec
5. Repeat esophagoscopy to assess for mucosal trauma/esophageal laceration
In-office unsedated transnasal balloon dilation of the esophagus and trachea
Catherine J. Rees

Figure 1 Endoscopic-guided transnasal balloon dilation of the upper esophageal sphincter

Note the excellent visualization of the larynx and pharynx during dilation because of the transnasal approach.
Cricopharyngeal Myotomy

• First performed in 1949
• Surgical gold-standard treatment for UES dysfunction
• Approaches
  • Transcervical open approach
  • Endoscopic laser-assisted approach
Open Cricopharyngeal Myotomy

General anesthesia, case duration 2 hours.

1. Direct laryngoscopy & esophagoscopy
2. Distend the esophagus with Maloney dilator or bougie or endotracheal tube
3. Transcervical incision at level of cricoid cartilage from SCM to SCM
4. Elevate subplatysmal flaps from thyroid notch to 2 to 3 cm below cricoid cartilage
5. Skeletonize the SCM medial border, open the carotid triangle
6. Retract the omohyoid inferiorly
7. Rotate the larynx to the right using a single hook
8. Inferior cornu of the thyroid cartilage is landmark for the level of the CP muscle
9. Perform CP myotomy with No. 15 blade in posterior midline from distal to proximal for 2.5 to 6 cm
10. Irrigate and close with a 10 flat drain.

NG tube is left in place, used to feed the patient for 24 hours. Esophagram is done on POD #1. If no leak is evident the NG tube is removed and patient is discharged home when JP drain output is low enough.
Endoscopic Cricopharyngeal myotomy with CO2 laser

General anesthesia. Case duration 15-30 minutes

1. Intubate with a 5.0 laser safe endotracheal tube
2. Expose the CP with a Dedo laryngoscope placed in the postcricoid area
3. Place in suspension – distal esophageal introitus can be appreciated
4. Esophagoscopy
5. Saline soaked pledgets are placed in the esophageal lumen
6. Operating microscope with line of sight CO2 laser is used
7. Laser is used to incise the mucosa in the midline of the CP and continued through the horizontal muscle fibers until the pharynx is flush with the esophageal lumen
8. Hemostasis is achieved with application of cocaine-soaked pledgets or endoscopic suction cautery. Mucosa is left to heal by secondary intention
Endoscopic CO2 laser assisted CP Myotomy
Cricopharyngeal Achalasia Treatment
MBSS before and after
Post-operative Care

In the absence of inadvertent pharyngotomy – postop care is similar with exception of drain management

- Admit overnight
- Ice chips day of surgery
- Soft diet POD 1 for two weeks
- Discharge on antibiotics and pain medicine

Open myotomy inpatient until drain is removed

If pharyngotomy occurs NG tube is placed

- NPO for 3 days
- POD Gastrograffin esophagram is done
- If no leak NG is removed and diet is advanced

Discharge on antibiotics and pain medicine
### Open vs. Endoscopic CP Myotomy

<table>
<thead>
<tr>
<th>Open</th>
<th>Endoscopic</th>
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<tbody>
<tr>
<td>Longer operating time 2 hours vs. 30 minutes</td>
<td>Shorter operating time</td>
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<tr>
<td>Longer hospital stay</td>
<td>Shorter hospital stay</td>
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<tr>
<td>Equal symptom reduction</td>
<td>Fewer complications</td>
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Cricopharyngeal Achalasia: Management and Associated Outcomes—A Scoping Review

Karuna Dewan, MD\textsuperscript{1}, Chloe Santa Maria, MD\textsuperscript{1}, and Julia Noel, MD\textsuperscript{1}

- 11% of CP achalasia – results from head and neck radiation treatment

- In the surgical treatment of CP achalasia those with radiation history are the most likely to have complications
  - Increased friability, fibrosis, loss of surrounding fat
  - Esophageal perforation, subcutaneous air, mediastinitis
Endoscopic Management of Postradiation Dysphagia in Head and Neck Cancer Patients: A Systematic Review

Sara Abu-Ghanem, MD, MMedSc¹, Chin-Kwang Sung, MD, MS¹, Attapon Junlapan, MD¹, Ann Kearney, MA, CCC-SLP, BRS-S¹, Elizabeth DiRenzo, PhD, CCC-SLP¹, Karuna Dewan, MD¹, and Edward J. Damrose, MD¹

• Systematic review of 539 articles
• Success rate and safety profile of endoscopic surgical options for UES stenosis/stricture in adult HNC patients with RT/CCRT induced dysphagia.
• Treatments included:
  • Esophageal dilation
  • CP myotomy
  • CP intramuscular botox injection
• Success rates (How do we define success?)
  • CP dilation 43 to 100%
  • CP myotomy 27 to 90%
  • CP Botox 65%
• Duration of improvement could not be assessed
The Role of Swallow Therapy

• Post-Radiation Dysphagia is NOT only a surgical problem
  • Multidisciplinary team: SLP, MD, Nutrition
• Pain management
• Dietary alterations
• Oral nutritional supplementation
• Exercise-based swallowing preservation protocols
  • Compensatory and rehabilitation strategies
  • Reduce aspiration, Improve bolus flow, Improve range of motion of oral and pharyngeal structures, Improve sensory-motor integration
Conclusions

• Surgical intervention is for structural or functional swallowing dysfunction that cannot be relieved by rehabilitation therapy alone

• Symptom reduction is equal between open and endoscopic CP bar management

• Fewer complications are noted with endoscopic management

• The longest lasting results are found with Endoscopic CO₂ laser CP myotomy

• Surgical intervention is effective in concert with rehabilitation therapy
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