Laryngeal Cancer
...From early to late

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Overview
• Epidemiology
• Staging & Survival:
  • Early stage laryngeal cancer
    ▪ Management
      – Endoscopic
      – Role of radiation
  • Late stage laryngeal cancer
    ▪ Management
      – Open surgery
• Innovation

Epidemiology

The rising rate of nonsmokers among laryngeal carcinoma patients: Are we facing a new disease?

N = 310
- N = 75 (24.2%) non smokers
- Glottic level
- 66.2 ± 17.5 years
- 7 etiology

Supraglottic SCC T staging

T1: Tumor limited to one subsite* of supraglottis with normal vocal cord motility.

T2: Tumor invades a subsite of one or more adjacent subsites of supraglottis or glides or extends outside the supraglottis (e.g., a subsite of base of tongue, vallecula, lateral wall of pyriform sinus) without fixation of the larynx.

T3: Tumor is limited to larynx with vocal cord fixation and/or invades any of the following: postcricoid area, PES, PGS, inner cortex thyroid cartilage.

T4a: Tumor invades through the thyroid cartilage, and/or extends into soft tissues of the neck, thyroid, or esophagus

T4b: Invades prevertebral space, encases carotid artery, invades mediastinal structures.

*Subsites include the following:
- Ventricular bands (false cords)
- Arytenoids
- Suprahyoid epiglottis
- Infrahyoid epiglottis
- Aryepiglottic folds (laryngeal aspect)
Glottic SCC T staging

- T1: Tumor limited to vocal cord(s) (may involve anterior or posterior commissure) with normal mobility
  - T1a: Tumor limited to one vocal cord
  - T1b: Tumor involves both vocal cords
- T2: Tumor extends to supraglottis and/or subglottis, and/or with impaired vocal cord mobility
- T3: Tumor limited to the larynx with vocal cord fixation and/or invasion of PGS and/or inner cortex of thyroid cartilage
- T4a: Tumor invades through outer cortex of thyroid cartilage and/or to other tissues beyond the larynx (e.g., trachea, soft tissues of neck, including thyroid, pharynx, strap muscles, esophagus)
- T4b: Involves prevertebral space, encases carotid artery, invades mediastinal structures

Subglottic SCC T staging

- T1: Tumor limited to the subglottis
- T2: Tumor extends to vocal cord(s) with normal or impaired mobility
- T3: Tumor limited to larynx with vocal cord fixation
- T4a: Tumor invades through outer cortex of thyroid cartilage and/or to other tissues beyond the larynx (e.g., trachea, soft tissues of neck, including thyroid, pharynx, strap muscles, esophagus)
- T4b: Involves prevertebral space, encases carotid artery, invades mediastinal structures

Survival

Data from various studies shows improved survival rates with combined treatment approaches, highlighting the importance of multidisciplinary care in managing head and neck cancers.
MACH-NIC. 2000 and 2009
- Concurrent chemotherapy
- Platinum based regimens

ONCOLOGIC CLEARANCE
FUNCTIONAL PRESERVATION

Case 1
73 year old male
- Dysphonia 4 months
- Non smoker
- Non drinker


Tis

<table>
<thead>
<tr>
<th>Level of observed localization (T stage)</th>
<th>MACH 2000 classification</th>
<th>SN classification</th>
<th>UICC classification</th>
<th>AJCC classification</th>
<th>WHO 2017 classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower 2/3</td>
<td>Squamous hyperplasia</td>
<td>Squamous hyperplasia</td>
<td>Low grade SL</td>
<td>Low grade papilloma</td>
<td></td>
</tr>
<tr>
<td>Upper 2/3</td>
<td>Squamous dysplasia</td>
<td>Squamous dysplasia</td>
<td>High grade SL</td>
<td>High grade papilloma</td>
<td></td>
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<tr>
<td>Full thickness</td>
<td>Squamous dysplasia</td>
<td>Squamous dysplasia</td>
<td>High grade SL</td>
<td>High grade papilloma</td>
<td></td>
</tr>
</tbody>
</table>
Role of Stroboscopy

- Good at diagnosing benign mid membranous lesions
- Does not reliably predict the presence of malignancy or depth of invasion


Utility of Laryngeal Margins

- All surgical margin positivities predict tumor recurrence
- BUT T1–T2 glottic tumors completely excised within negative margins may relapse
- Recurrence rates ranging from 3.1 to 22.8%


Case 1

COLLECTION DATE: 04/08/2022
Surgical Pathology Report

SPECIMEN SOURCE:
A. F. S. - RIGHT VOCAL CORD LESION
B. RIGHT VOCAL CORD LESION
C. RIGHT ANTERIOR MARGIN
D. RIGHT POSTERIOR MARGIN
E. RIGHT DEEP MARGIN

DIAGNOSIS:
A, B. Right vocal cord lesion (excision): Fragments of at least in situ squamous cell carcinoma, highly suspicious for invasion
C. Right anterior margin (excision): In situ squamous cell carcinoma
D. Right posterior margin (excision): Negative for dysplasia and carcinoma
E. Right deep margin (excision): Negative for carcinoma

Case 1

Microdirect laryngoscopy with cordectomy

DIAGNOSIS:
A. Right anterior vocal cord (biopsy): High-grade squamous dysplasia, superficial strip. The base of the lesion is not well represented for evaluation of invasive growth.
B. Right vocal cord (excision): Negative for tumor and dysplasia
C. Right anterior vocal cord (excision): Negative for tumor and dysplasia

ELS Cordectomy Classification

Type 1: Subglottic
Type 2: Midvocal
Type 3: Superficial
Type 4: Deep
Type 5: Anterior subglottic
Type 6: Anterior cricoarytenoid}

ELS Cordectomy Classification

Type 1: Extirpates the false vocal fold
Type 2: Extirpates the subglottis
Type 3: Extirpates the anterior subglottic
Type 4: Extirpates the arytenoid
Case 2

60 year old male
- Dysphonia 4 years
- 30 pack year smoking history
- Drinks 12 beers/week

Microdirect laryngoscopy with biopsy

A. MID LEFT VOCAL CORD
B. ANTERIOR LEFT VOCAL CORD
C. LEFT VOCAL PROCESS
D. MID RIGHT VOCAL CORD

DIAGNOSIS:
A. Mid left vocal cord (biopsy): High grade squamous dysplasia. An invasive component is not identified.
B. Anterior left vocal cord (biopsy): High grade squamous dysplasia. An invasive component is not identified.
C. Left vocal process (biopsy): At least high grade squamous dysplasia. An invasive component cannot be excluded in this specimen.
D. Mid right vocal cord (biopsy): High grade squamous dysplasia. An invasive component is not identified.
**Surgery Vs RT - Survival**

Comparison of survival between radiation therapy and trans-oral laser microsurgery for early glottic cancer patients, a retrospective cohort study.

**Conclusion:** No difference was demonstrated in the 5-year disease-specific survival, disease-free survival, and total larynx-preserving survival, between the RT and TLM treatment groups. Additionally, both groups showed similar 5-year survival after stratifying by confounding variables.

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**Surgery Vs RT - Voice**

Long term voice outcome following radiation versus laser microsurgery in early glottic cancer.

**Conclusion:** This is the first multi-modality voice analysis to suggest TLM results in better VHI than both RT or surgical score and subjective voice analysis but not in self-perception. These differences may reflect long-term effects of RT on glottis tissue. A randomized controlled study is required to confirm our findings.

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**Surgery Vs RT - Cost**

Radiotherapy versus laser microsurgery in the treatment of early glottic cancer

**Results:** It was found that radiation therapy was approximately four times more expensive than TLM.

**Conclusion:** This study suggests that TLM should be the preferred treatment option for treating early glottic cancer in Canada and it is the most economical and has been shown in previous studies to be as effective as radiation therapy in both cure rates and quality of life.

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**Case 3**

62 year old male

- Dysphonia 3 months
- Smoker
- Direct microlaryngoscopy (Referring surgeon)
- SCC, moderately differentiated

**Diagnosis:**
A. Deep margin: Negative for tumor
B. Posterior margin: Negative for tumor
C. Anterior margin: Negative for tumor

D. Right vocal cord lesion: Focus of in-situ squamous cell carcinoma (1 mm). No invasive component identified. Subepithelial tissues with chronic inflammation and fibrosis.
Open Partial Laryngeal Surgery

- Limited indications now:
  - Increased morbidity
  - Inferior outcomes (cf TOL)

- Indications:
  - Poor endoscopic access
  - Limited recurrence post-RT

Surgical Options

- Vertical:
  - Vertical Partial Laryngectomy

- Horizontal:
  - Horizontal Supraglottic Laryngectomy
  - Supracricoid Laryngectomy

VPL

- Indications:
  - Lesion of mobile cord up to AC or vocal process
  - Subglottic extension <5mm

- Outcomes:
  - T1 local control >90%
  - T2 local control <80%

- Cautions:
  - AC involvement
  - Extension beyond glottis
  - Impaired cord mobility

- Variants:
  - Frontolateral
  - Posterior lateral
  - Extended

- Reconstruction:
  - Strap muscle rotation
  - Imbrcation

SUPRAGLOTTIC LARYNGECTOMY

- Resects:
  - Epiglottis (+/- hyoid), pre-epiglottic space, thyrohyoid membrane, upper 1/2 thyroid cartilage, supraglottic mucosa

- Indications:
  - Supraglottic lesion
  - True VCs mobile
  - No cartilage invasion
  - 5mm clear of AC

- Outcomes:
  - >90% control for T1/T2
**Supracricoid Laryngectomy**

2 options
- CHEP - glottic lesion
  - T1b with AC involvement
- CHP - supraglottic lesion
  - Supraglottic lesion extending to glottis
  - T3 transglottic lesion with impaired mobility of TVC

Significant speech/swallowing issues
- NGT 30-365 days
- TL in 10%

High success rates
- Excision of B/L paraglottic spaces, pre-epiglottic space and thyroid cartilage

**Membranes of the Larynx**

**Extrinsic**
- Thyrohyoid
- Hyoepiglottic
- Cricotracheal
- Aryepiglottic

**Intrinsic**
- Quadrangular membrane
- Conus elasticus

**Intrinsic Membranes**

- Quadrangular membrane
  - Epiglottis to arytenoid/corniculate
  - Covered with mucosa to form AE fold
  - Separates larynx and hypopharynx

- Conus elasticus
  - Cricoid cartilage
  - Thyroid-arytenoid
  - Free edge is vocal ligament
LARYNGEAL SPACES

Pre-epiglottic space
- Thyroid cartilage/thyrohyoid membrane
- Epiglottis/thyroepiglottic lig
- Hyoepiglottic lig

Paraglottic space
- Thyroid cartilage
- Conus elasticus
- Cricoid cartilage
- Quadrangular membrane
- Pyriform fossa

RELEVANCE

- Membranes prevent spread of cancer
  - Supraglottic tumors access pre-epiglottic space via glandular perforations in epiglottis
- Once into the spaces can spread quickly
  - Paraglottic and pre-epiglottic are continuous
  - Transglottic tumors
- Important to recognize for accurate staging

Case 4

73 year old male
- Dysphonia 6 weeks
- PMHx Lung Cancer
- Ex smoker, drinker, WTC

T3
RT Descalation Larynx

- No evidence
- Subject to further investigation!

T4

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**Case 5**

60 year old male

- PMHx T4N1M0 transglottic SCC HPV negative
- Treated with ChemXRT + Immunotherapy
- Tracheostomy but then decannulated
- Prior to completion of immunotherapy hospitalized for pneumonia likely due to aspiration
- Tracheostomy and PEG
- Repeat PET scan demonstrated stability

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Voice Rehabilitation – Present & The Future

Whether you choose a custom vocal legacy or Roland Adkins voice we have a vocal that fits.

REAL VOICE

Surgical voice

PRETEND VOICE

Second generation voice

https://vocalid.ai

Swallow Rehabilitation – Present & The Future

Present
- Swallow Therapy
- Surgery
  - Dilation
  - Botox

Future
- CN Stimulation?
Laryngeal Chondrosarcoma

Case 6
54 year old male
Dysphonia 2 years
Outside workup including CT and biopsy
Demonstrated a low grade chondrosarcoma
Referred in for partial laryngeal surgery

Rib Graft + Fascial Free Flap Reconstruction

The Mount Sinai Team
Eric Genden
Marta Teng
Scott Roof
Mark Courey
Peal Woo
Matt Mori
Tamir Kotz, SLP
Leanne Goldberg, SLP
Sarah Brown, SLP
Olivia Boddicker, SLP

Rich Bakst
Marshall Posner
Krys Misiukiewicz
Summary

• Always consider the oncologic and functional
• Voice, airway and swallow
• Know your trials
• Be proficient at management of early to late
  • Endoscopic
  • Open
• Think innovatively

Questions?

Thank you

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