SURGICAL MANAGEMENT OF T4A CA LARYNX

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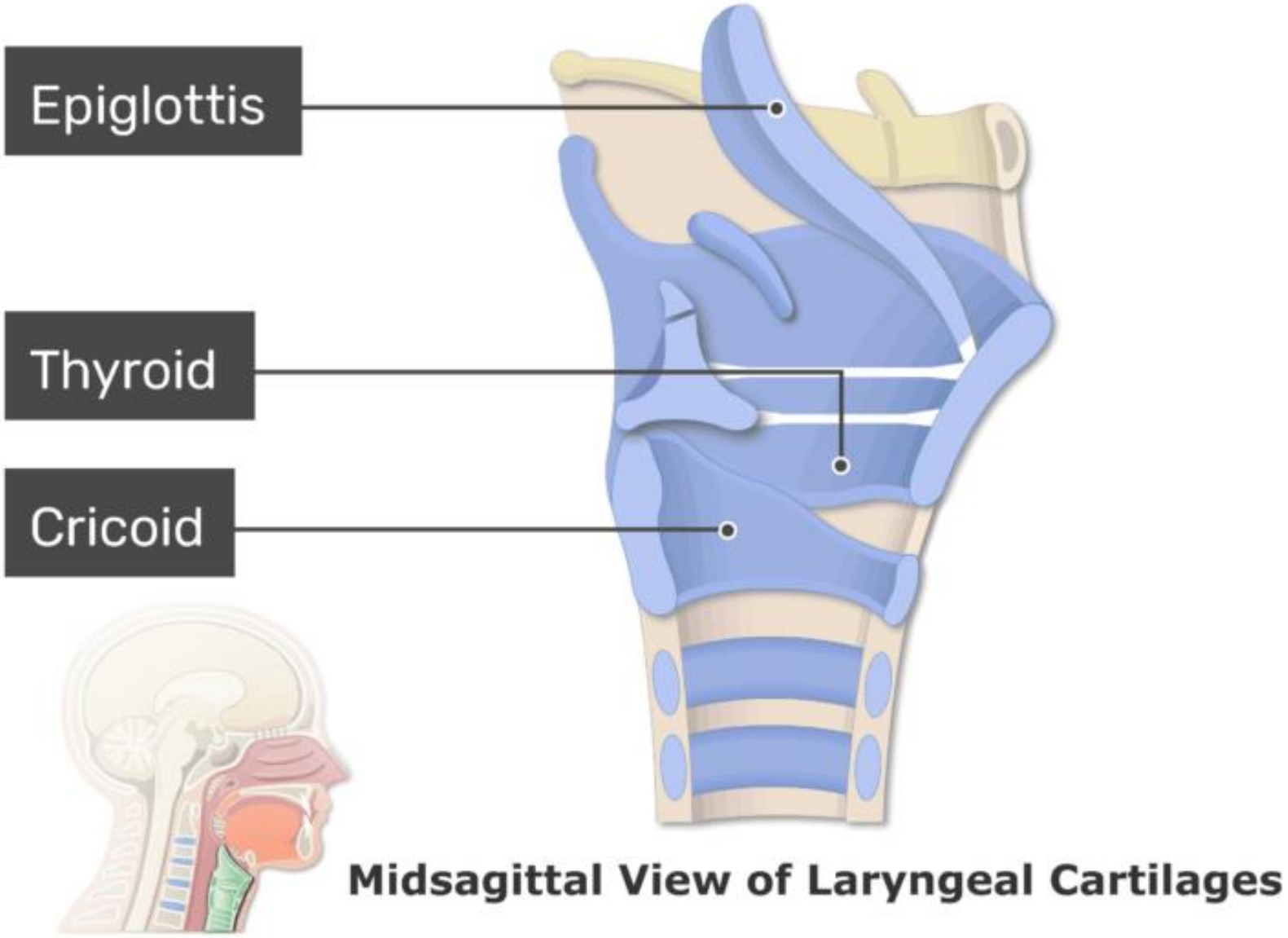
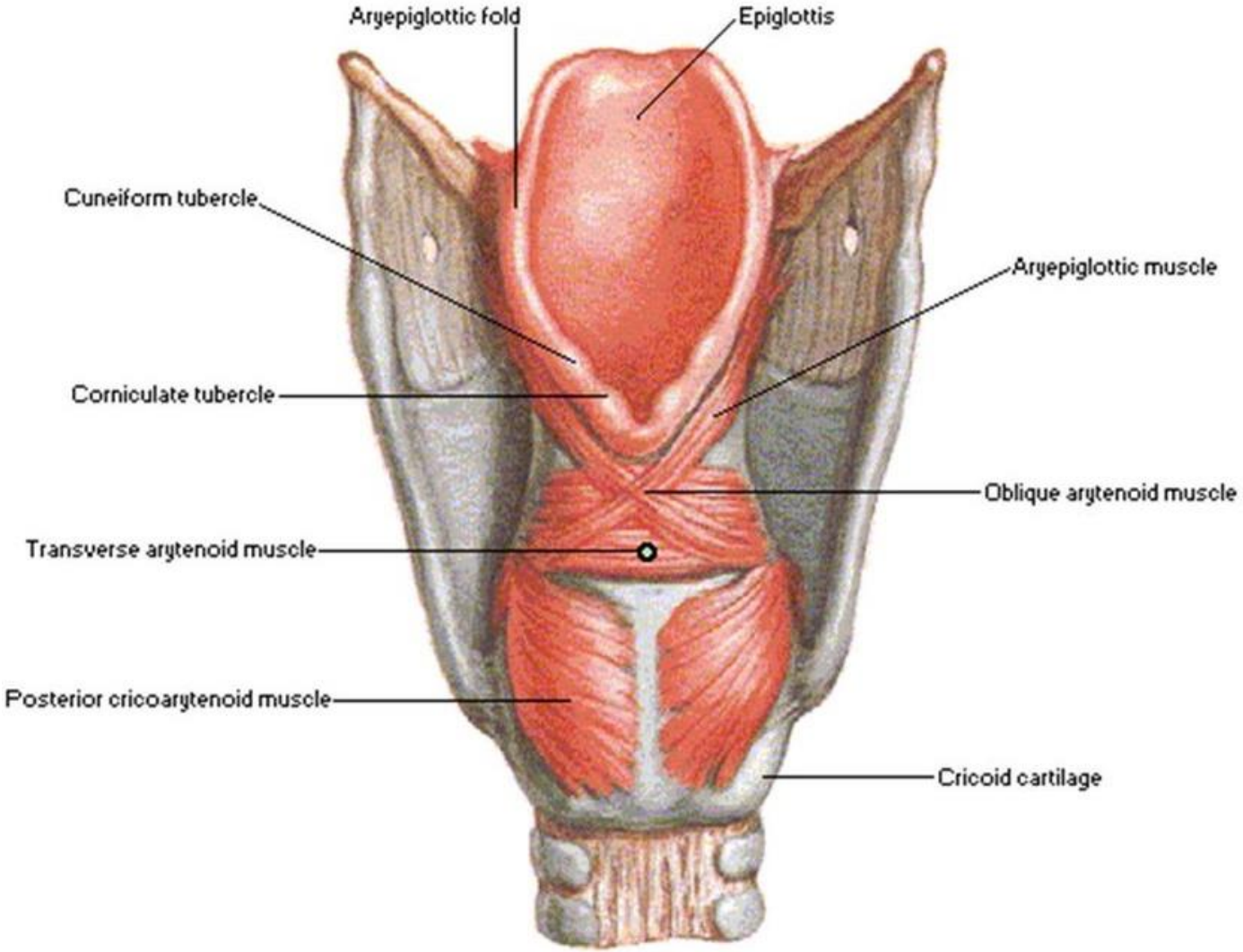
ANATOMY

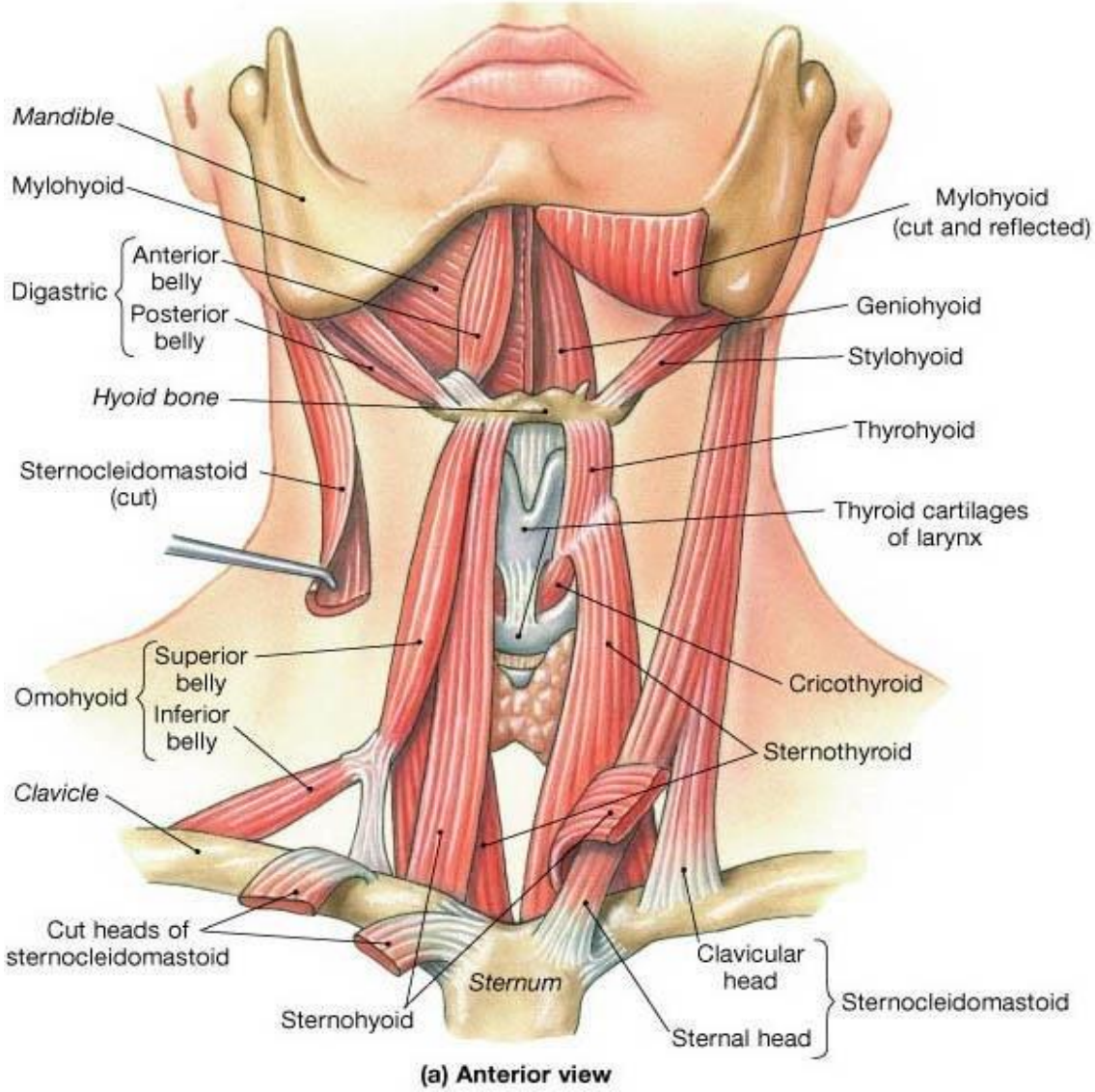
BONES & CARTILAGES



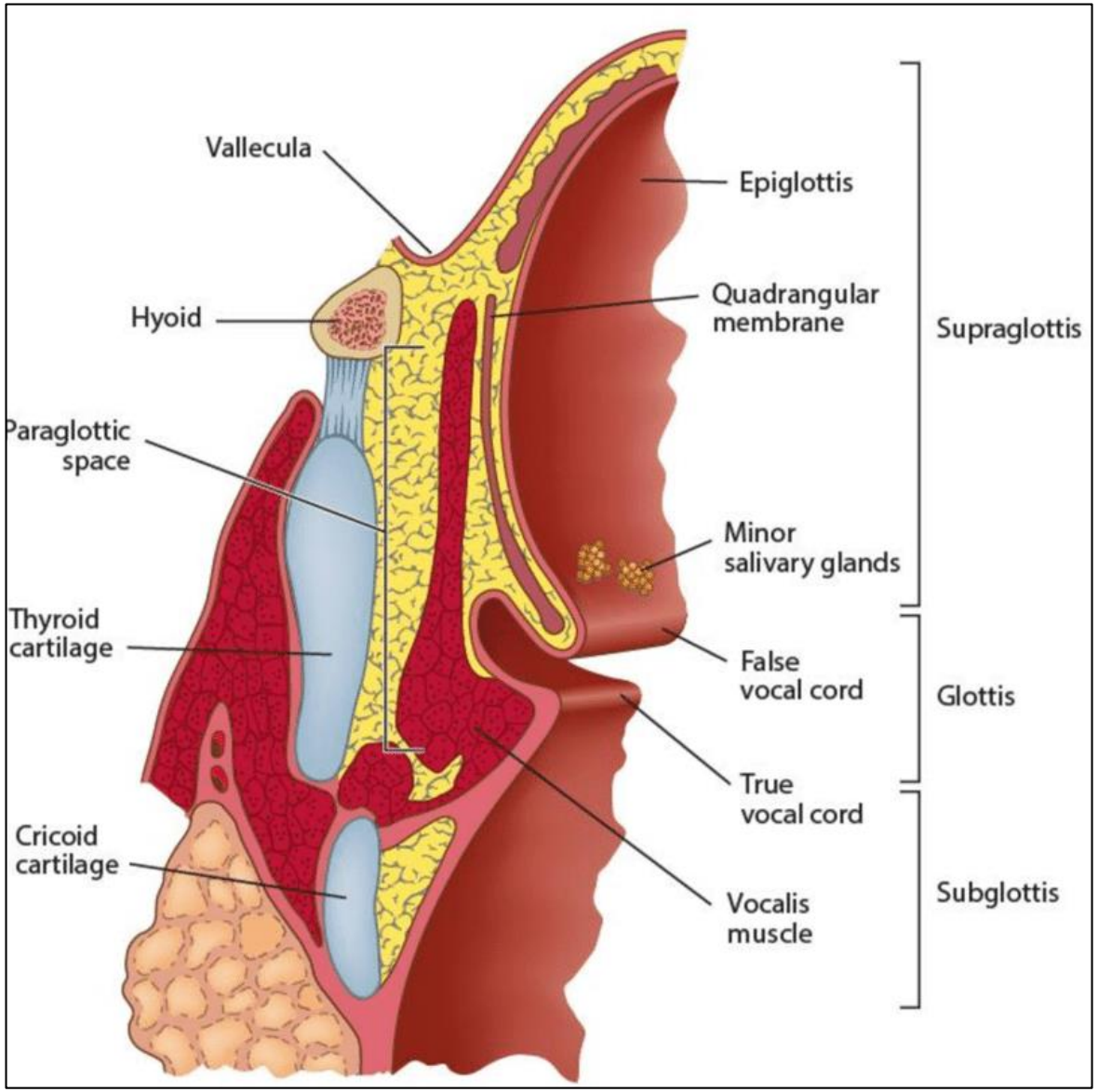
Midsagittal View of Laryngeal Cartilages

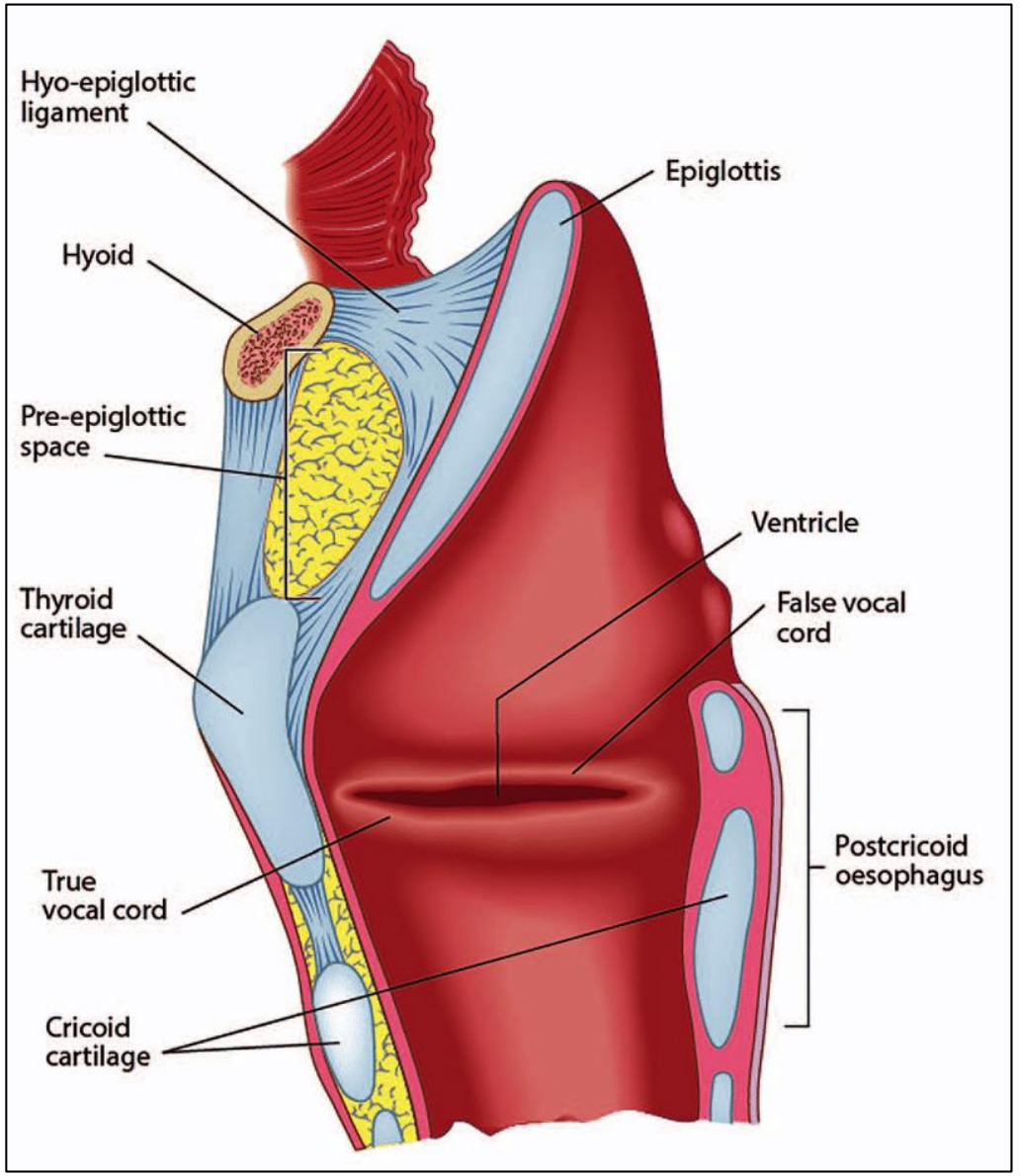
MUSCLES


Aryepiglottic fold
Epiglottis
Cuneiform tubercle
Aryepiglottic muscle
Corniculate tubercle
Oblique arytenoid muscle
Transverse arytenoid muscle
Posterior cricoarytenoid muscle
Cricoid cartilage


Mandible
Mylohyoid
Digastric
Anterior belly
Posterior belly
Hyoid bone
Sternocleidomastoid (cut)
Omohyoid
Superior belly
Inferior belly
Clavicle
Cut heads of sternocleidomastoid
Sternum
Sternohyoid
Mylohyoid (cut and reflected)
Geniohyoid
Stylohyoid
Thyrohyoid
Thyroid cartilages of larynx
Cricothyroid
Sternothyroid
Clavicular head
Sternal head
Sternocleidomastoid
(a) Anterior view

SPACES OF LARYNX





LARYNGEAL CANCER

- SCC – 95%
- Tobacco & alcohol: act synergistically
- Reflux
- Early (stage I & II): Single modality treatment
- Advanced (stage III & IV): Multimodality treatment

POINTS TO CONSIDER

- Organ Preservation
- Voice quality
- Disease-free survival
- Overall survival

American Joint Committee on Cancer (AJCC) TNM Staging System for the Larynx (8th ed., 2017)
(Nonepithelial tumors such as those of lymphoid tissue, soft tissue, bone and cartilage, and mucosal melanoma of the lip and oral cavity are not included)

Primary Tumor (T)

TX Primary tumor cannot be assessed

Tis Carcinoma *in situ*

Supraglottis

T1 Tumor limited to one subsite of supraglottis with normal vocal cord mobility

T2 Tumor invades mucosa of more than one adjacent subsite of supraglottis or glottis or region outside the supraglottis (eg, mucosa of base of tongue, vallecula, medial wall of pyriform sinus) without fixation of the larynx

T3 Tumor limited to larynx with vocal cord fixation and/or invades any of the following: postcricoid area, preepiglottic space, paraglottic space, and/or inner cortex of thyroid cartilage

T4 Moderately advanced or very advanced

T4a Moderately advanced local disease
Tumor invades through the outer cortex of the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)

T4b Very advanced local disease
Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Glottis

T1 Tumor limited to the 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 paraglottic space and/or inner cortex of the thyroid cartilage

T4 Moderately advanced or very advanced

T4a Moderately advanced local disease
Tumor invades through the outer cortex of the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, cricoid cartilage, soft tissues of neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)

T4b Very advanced local disease
Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Subglottis

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 and/or inner cortex of the thyroid cartilage

T4 Moderately advanced or very advanced

T4a Moderately advanced local disease
Tumor invades cricoid or thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscles of the tongue, strap muscles, thyroid, or esophagus)

T4b Very advanced local disease
Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

TREATMENT STRATEGIES

ORGAN/VOICE PRESERVATION

- RT/CTRT
- Surgery

TOTAL LARYNGECTOMY

RADIOTHERAPY

- Mainstay of organ preservation strategies
- Often combined with other treatments
- Primary RT has a limited role
- Induction CT f/b RT
- Concurrent CTRT: Current standard of care
- Adjuvant RT: To decrease local recurrence
- Limited role in advanced cancers with cartilage invasion (T4a)

ORGAN PRESERVATION TRIALS

Study	Year	Arms	Outcome	Laryngeal preservation
VA trial [19]	1991	Induction chemo followed by RT vs. surgery + RT	After two cycles of chemo clinical CR 31%, PR 54%, 2-year survival 68% in both the groups. 36% of the patients of chemotherapy group required total laryngectomy.	Overall larynx preservation was 64% in the nonsurgical arm.
GORTEC trial [23]	2000 - 2001	Induction chemo with TPF vs. PF followed by radiotherapy or surgery according to the response	Overall response rate after induction chemotherapy was higher with TPF (80% versus 59% (P = 0.002). There was no significant difference between the treatment arms in the 3-year rate of overall (60% in each arm) or disease-free (58% with TPF versus 44% with PF) survival	The 3-year larynx preservation rate was significantly higher in the TPF arm than in the PF arm (70% versus 58%; P = 0.03).

RTOG 91-11 [20]	2003	RT vs. induction chemo followed by RT vs. CTRT	At a median follow-up of 3.8 years local control significantly better in CTRT arm (78%) vs. induction chemo followed by RT (61%) vs. RT alone (56%). Overall survival similar in all three groups	Larynx preservation was significantly higher in the CTRT arm (88%) as compared to induction chemo followed by RT(75%; P = 0.005)) or RT alone (70%; P ≤ 0.001).
RTOG 91-11 update [21]	2013	RT vs. induction chemo followed by RT vs. CTRT	Median follow-up for surviving patients is 10.8 years. Both chemotherapy regimens significantly improved LFS compared with RT alone (induction chemotherapy vs. RT alone: hazard ratio (HR), 0.75; 95% CI, 0.59 to 0.95; P = 0.02; concomitant chemotherapy v RT alone: HR, 0.78; 95% CI, 0.78 to 0.98; P = 0.03). Overall survival did not differ significantly, although there was a possibility of worse outcome with concomitant relative to induction chemotherapy (HR, 1.25; 95% CI, 0.98 to 1.61; P = 0.08)	Concomitant cisplatin/RT significantly improved the larynx preservation rate over induction PF followed by RT (HR, 0.58; 95% CI, 0.37 to 0.89; P = 0.0050) and over RT alone (P < 0.001), whereas induction PF followed by RT was not better than treatment with RT alone (HR, 1.26; 95% CI, 0.88 to 1.82; P = 0.35).

LIMITATION OF RT FOR T4a CANCERS

- RADIO RESISTANCE:
- LARYNGEAL CHONDRONECROSIS:

SURGICAL ORGAN PRESERVATION

OPEN/EXTERNAL

Vertical Partial laryngectomy

Supraglottic Laryngectomy

Supracricoid Laryngectomy

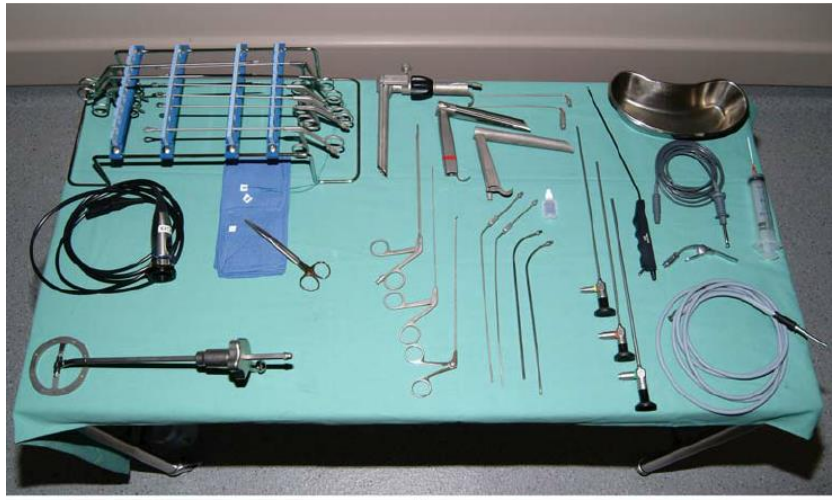
ENDOSCOPIC

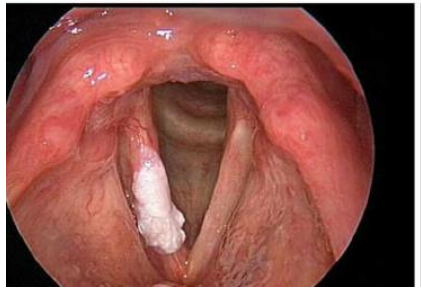
Transoral Laser Microsurgery

Trans oral robotic surgery

Powered/Microdebrider excision

Coblation excision





TRANSORAL LASER SURGERY

- “Inside Out”. Preserve the normal anatomy
- Operating microscope: “magnified view”
- Laser: CO2 most common
- Mircomanipulators: Precise dissection
- Healing by secondary intention
- Restricted access: trismus, inability to extend the neck
- T1, T2, and selected T3 tumors
- Debulking for palliation
- Limitations: specialized equipment
- Safety considerations

TRANSORAL ROBOTIC SURGERY

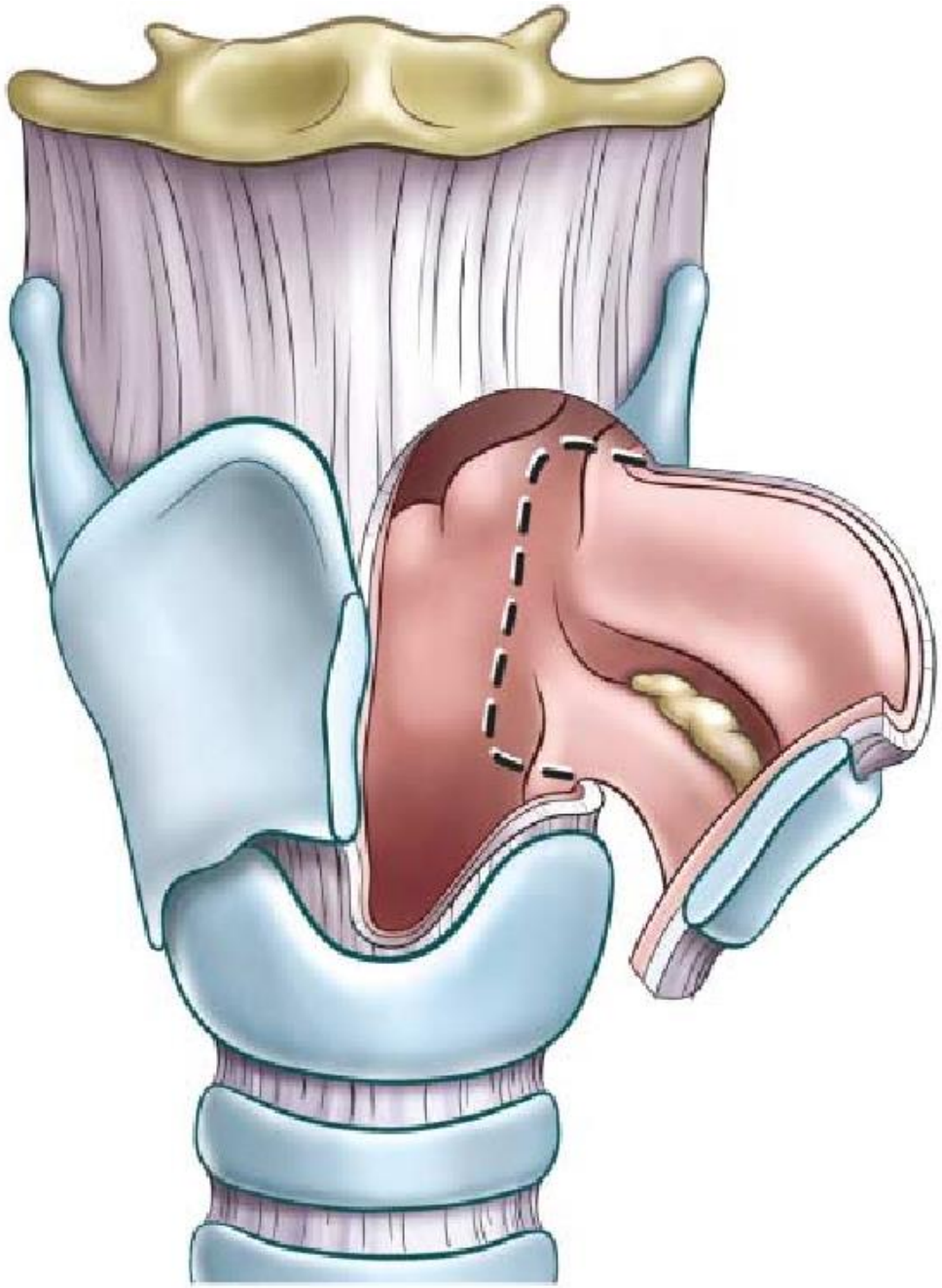
- Main application is oropharyngeal cancers
- TORS Supraglottic laryngectomy: most common
- TORS Total Laryngectomy
- Wide-field visualization
- 3D vs 2D view with a TLM
- Improvement in surgical dexterity

PARTIAL LARYNGECTOMY

- Pre-operative assessment is important
- Cricoarytenoid unit: Basic functional unit. Preservation of at least one unit is required for laryngeal function
- Chronic aspiration necessitating temporary tracheostomy
- Long-term risk of airway stenosis from scarring and/or extensive atrophy
- Unpredictable functional outcome
- Maintenance of anatomical structure may not always translate to functional outcome

1. Vertical Partial laryngectomy

- Early glottic cancer without AC involvement
- Vertical transection of the thyroid cartilage and glottic resection extending into paraglottic space
- C/I: Involvement of CA joint, thyroid cartilage & more than 1/3 rd of opposite cord

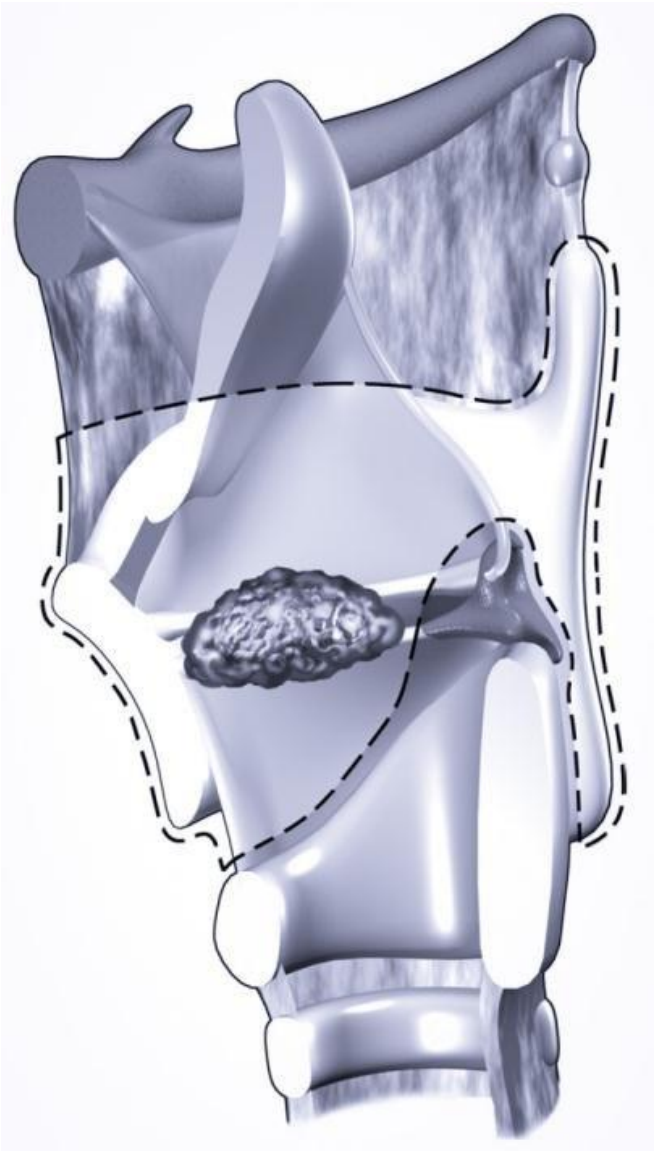


2. Supraglottic laryngectomy

- Supraglottic cancers: Early and intermediate
- Good voice quality as cords are preserved
- C/I: Cord fixity, involvement of glottis
- Chronic aspiration is the norm with open supraglottic laryngectomies (67-100% cases)
- May need a prolonged tracheostomy and/or PEG feeding

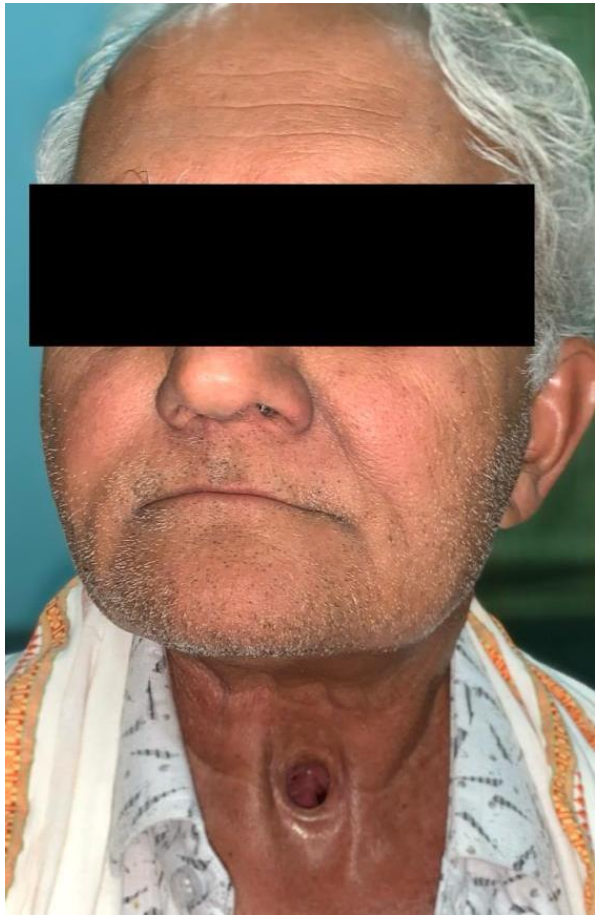
3. Supracricoid Laryngectomy with cricohyoidopexy (CHP)

- Bridges the gap between partial and total laryngectomy
- At least one crico-aretynoid unit (CAU) has to be preserved
- Excision of entire pragalottic space along with thyroid cartilage. Also, pre-epiglottic space and epiglottis can be excised
- “Reconstruction” is done by bringing cricoid and hyoid together
- Stenosis and aspiration are main complications



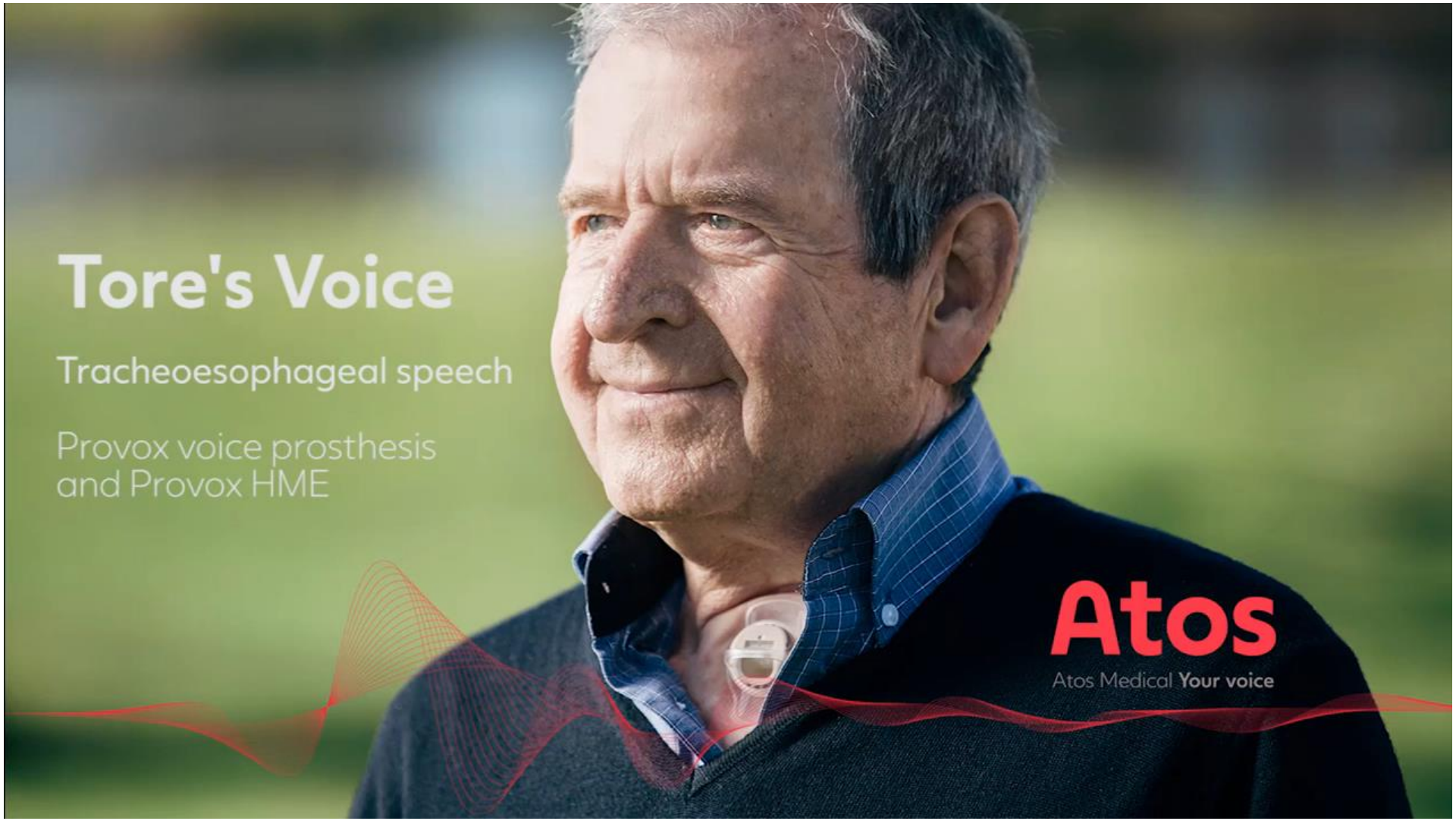
TOTAL LARYNGECTOMY

- 1st total laryngectomy was carried out by Billroth in 1873
- TOC for advanced laryngeal cancer
- Gold standard oncologically
- Permanent neck stoma for breathing
- Complete loss of natural voice
- Partial laryngectomy, CT & RT not feasible
- When the laryngeal tumour has invaded cartilage/extra laryngeal tissues of the neck

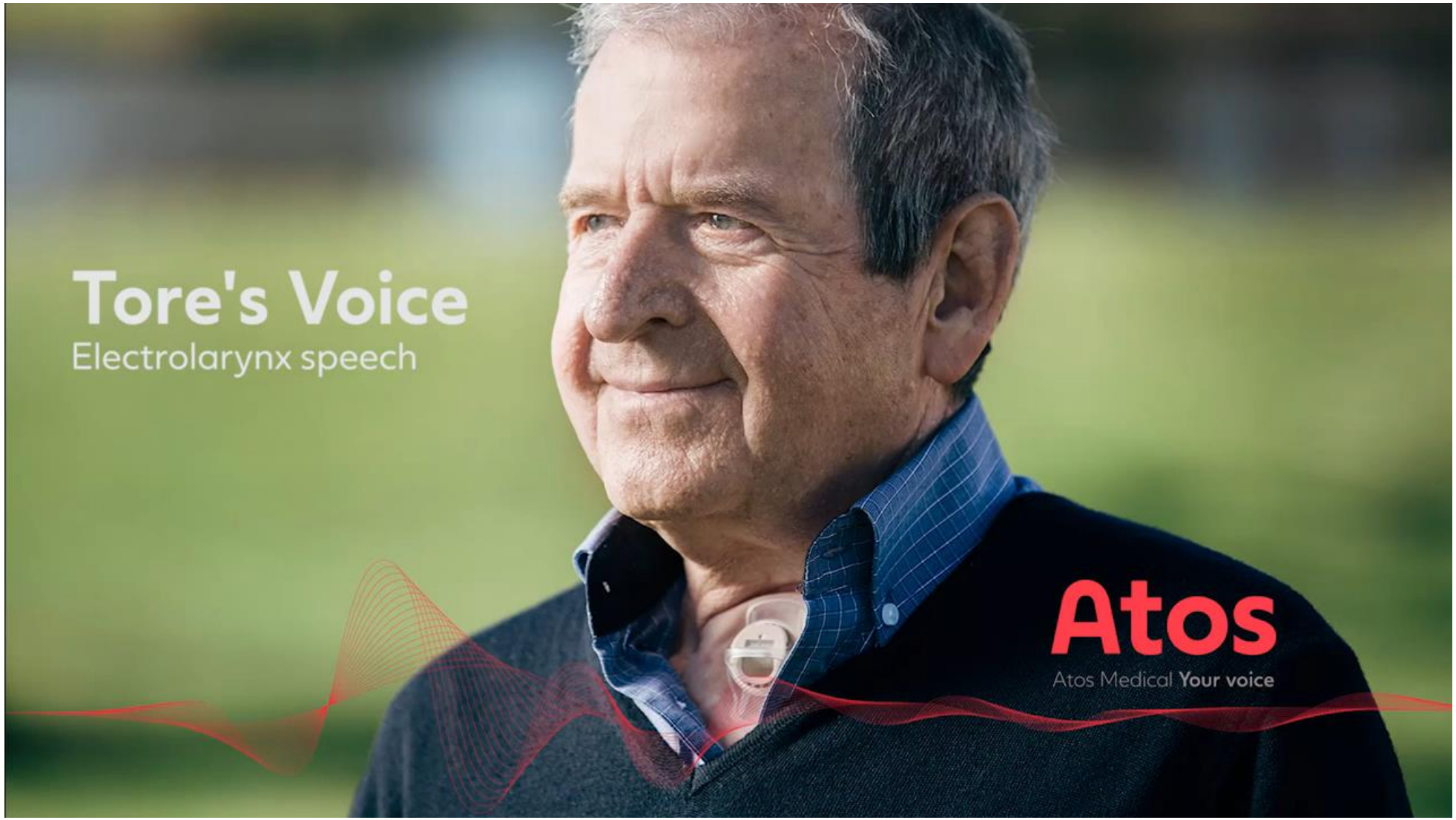


POST LARYNGECTOMY VOICE REHABILITATION

1. Tracheoesophageal Voice Prosthesis (TEP)



2. Electrolarynx



3. Oesophageal speech