2025 City of Hope Multidisciplinary Thyroid Cancer Symposium

Surgical Approaches for Thyroid Cancer

Krupal Patel, MD, MSc

Assistant Professor

Division of Head & Neck Surgery

City of Hope Comprehensive Cancer Center

Disclosures

- I do not have any relevant financial relationships.

This presentation and/or comments will provide a balanced, non-promotional, and evidence-based approach to all diagnostic, therapeutic and/or research related content.

Cultural Linguistic Competency (CLC) & Implicit Bias (IB)

STATE LAW:

The California legislature has passed Assembly Bill (AB) 1195, which states that as of July 1, 2006, all Category 1 CME activities that relate to patient care must include a cultural diversity/linguistics component. It has also passed AB 241, which states that as of January 1, 2022, all continuing education courses for a physician and surgeon **must** contain curriculum that includes specified instruction in the understanding of implicit bias in medical treatment.

The cultural and linguistic competency (CLC) and implicit bias (IB) definitions reiterate how patients' diverse backgrounds may impact their access to care.

EXEMPTION:

Business and Professions Code 2190.1 exempts activities which are dedicated solely to research or other issues that do not contain a direct patient care component.

This presentation is dedicated solely to research or other issues that do not contain a direct patient care component.

Thyroid cancer

Papillary Thyroid Cancer

Follicular Thyroid Cancer

Medullary Thyroid Cancer

Anaplastic Thyroid Cancer

Aims of Thyroid Cancer Surgery

- Remove the primary tumor
- Minimize the risk of disease recurrence and spread
- Facilitate postoperative radioactive iodine
- Accurate staging and risk stratification
- Surveillance
- Minimize treatment-related morbidity

Haugen et al. ATA Guidelines 2015

Aims of Thyroid Cancer Surgery

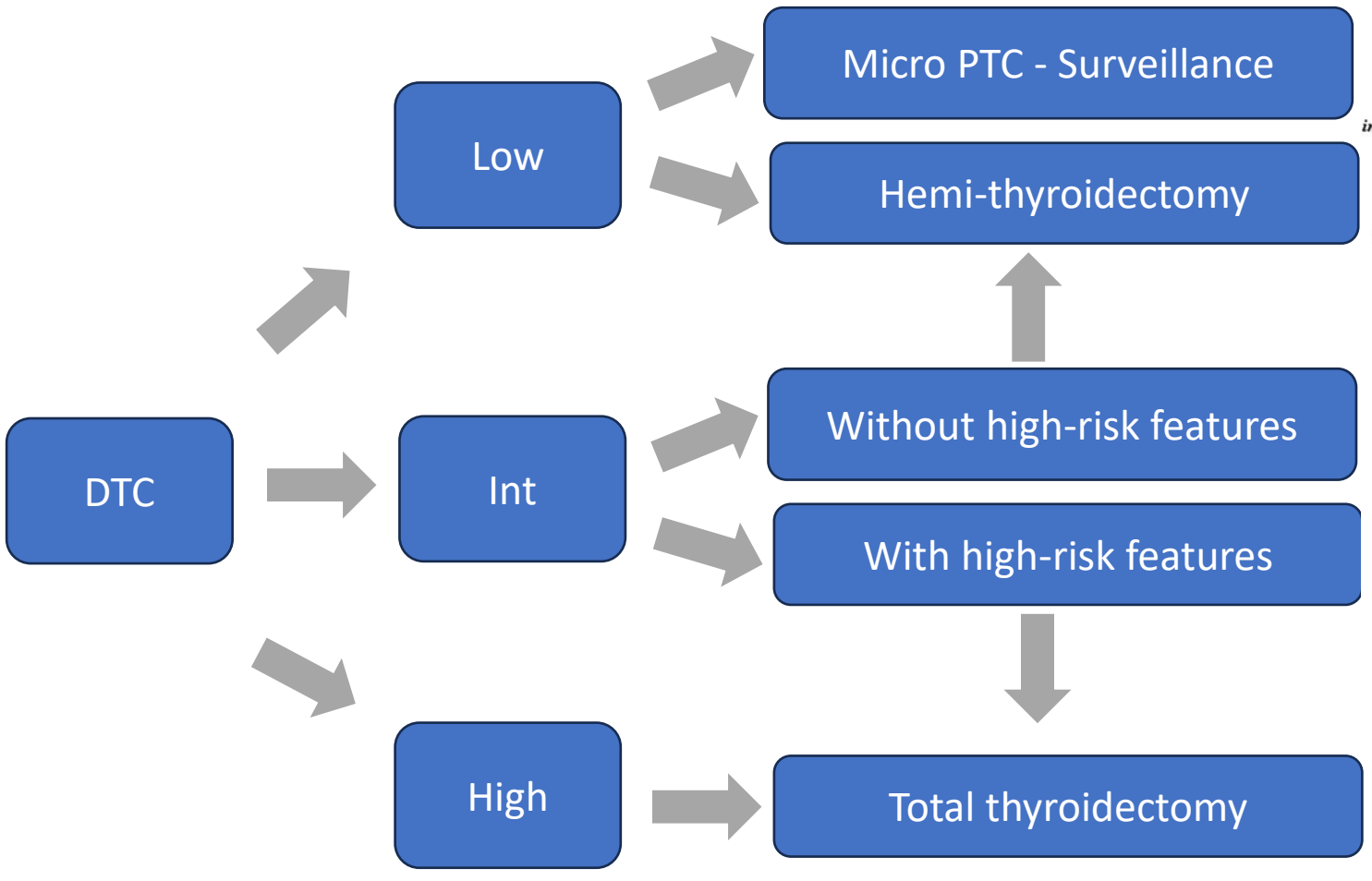
- Removal of the entirety of cancer
- Removal of macroscopic disease
- Removal of as much disease as possible to maximize adjuvant treatments (surgical palliation)

Total vs Hemi-thyroidectomy

- Total thyroidectomy
  - Removal of the entire thyroid
  - Vocal Cord Paralysis
  - Hypoparathyroidism
  - Overnight hospital stay

- Hemi-thyroidectomy
  - Removal of the half or part of thyroid
  - Vocal Cord Paralysis
  - Day surgery

Risk Based Approach for DTC



High Risk
Gross extrathyroidal extension, incomplete tumor resection, distant metastases, or lymph node >3 cm

Intermediate Risk
Aggressive histology , minor extrathyroidal extension, vascular invasion, or > 5 involved lymph nodes (0.2-3 cm)

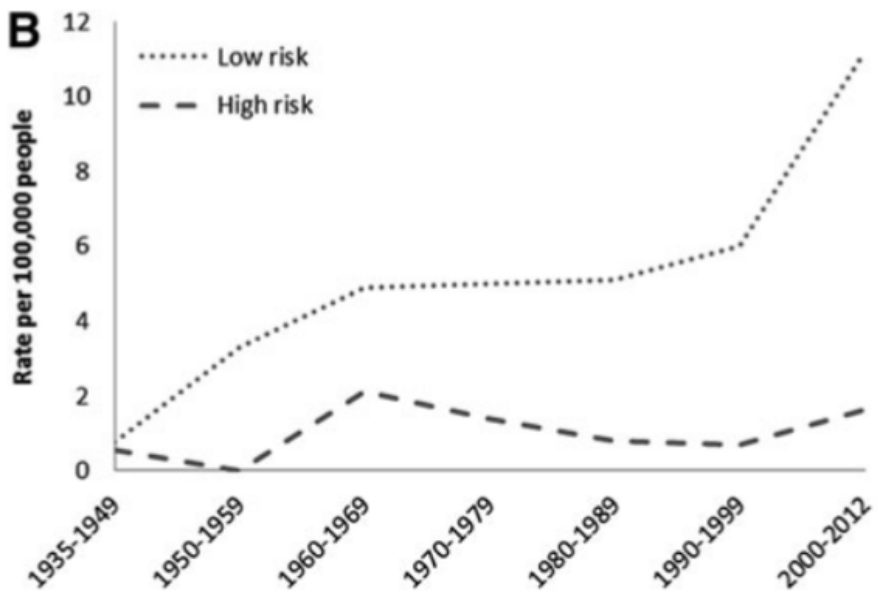
Low Risk
Intrathyroidal DTC ≤ 5 LN micrometastases (< 0.2 cm)

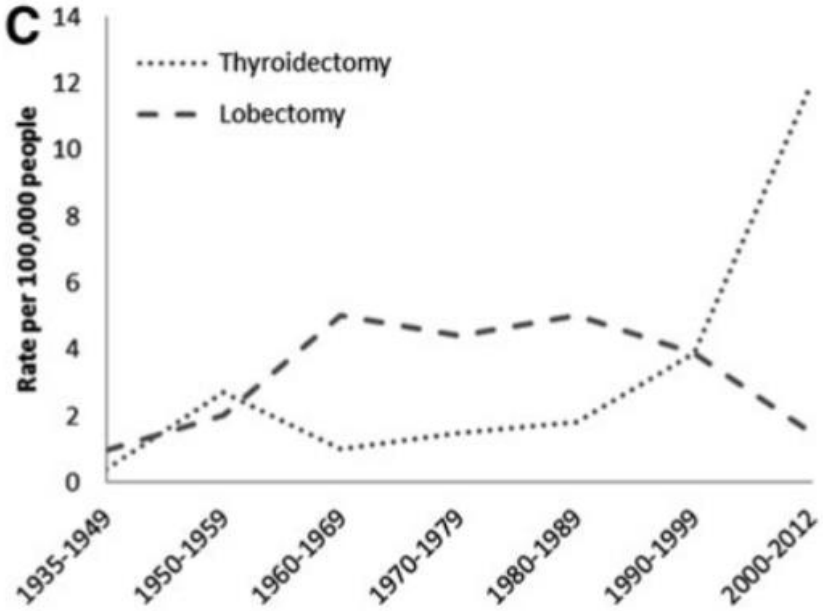
Risk of Structural Disease Recurrence
(In patients without structurally identifiable disease after initial therapy)

- FTC, extensive vascular invasion (≈ 30-55%)
- pT4a gross ETE (≈ 30-40%)
- pN1 with extranodal extension, >3 LN involved (≈ 40%)
- PTC, > 1 cm, TERT mutated ± BRAF mutated* (>40%)
- pN1, any LN > 3 cm (≈ 30%)
- PTC, extrathyroidal, BRAF mutated*(≈ 10-40%)
- PTC, vascular invasion (≈ 15-30%)
- Clinical N1 (≈20%)
- pN1, > 5 LN involved (≈20%)
- Intrathyroidal PTC, < 4 cm, BRAF mutated* (≈10%)
- pT3 minor ETE (≈ 3-8%)
- pN1, all LN < 0.2 cm (≈5%)
- pN1, ≤ 5 LN involved (≈5%)
- Intrathyroidal PTC, 2-4 cm (≈ 5%)
- Multifocal PTMC (≈ 4-6%)
- pN1 without extranodal extension, ≤ 3 LN involved (2%)
- Minimally invasive FTC (≈ 2-3%)
- Intrathyroidal, < 4 cm, BRAF wild type* (≈ 1-2%)
- Intrathyroidal unifocal PTMC, BRAF mutated*, (≈ 1-2%)
- Intrathyroidal, encapsulated, FV-PTC (≈ 1-2%)
- Unifocal PTMC (≈ 1-2%)

Haugen et al. ATA Guidelines 2015

Increase in low risk cancers with increase in total thyroidectomy





Thyroid > Vol. 25, No. 9

Research Article | NO ACCESS | Published Online: 31 August 2015

The Impact of Subclinical Disease and Mechanism of Detection on the Rise in Thyroid Cancer Incidence: A Population-Based Study in Olmsted County, Minnesota During 1935 Through 2012

Authors: Juan P. Brito, Alaa Al Nofal, Victor M. Montori, Ian D. Hay, and John C. Morris | AUTHORS INFO & AFFILIATIONS

Publication: Thyroid • https://doi.org/10.1089/thy.2014.0594

Active surveillance

JAMA Otolaryngol Head Neck Surg. 2017 Oct 19;143(10):1015–1020. doi: 10.1001/jamaoto.2017.1442

Natural History and Tumor Volume Kinetics of Papillary Thyroid Cancers During Active Surveillance

R Michael Tuttle [1,✉], James A Fagin [1,2], Gerald Minkowitz [3,4], Richard J Wong [5], Benjamin Roman [5], Snehal Patel [5], Brian Untch [5], Ian Ganly [5], Ashok R Shaha [5], Jatin P Shah [5], Mark Pace [1], Duan Li [6], Ariadne Bach [6], Oscar Lin [7], Adrian Whiting [1], Ronald Ghossein [7], Inigo Landa [2], Mona Sabra [1], Laura Boucai [1], Stephanie Fish [1], Luc G T Morris [5]

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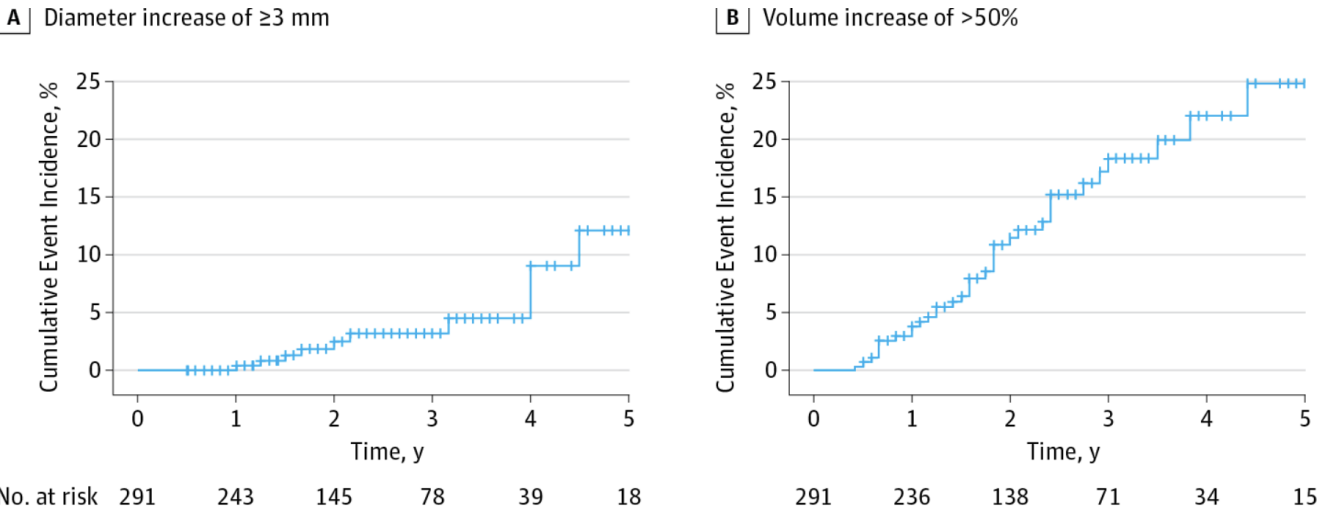
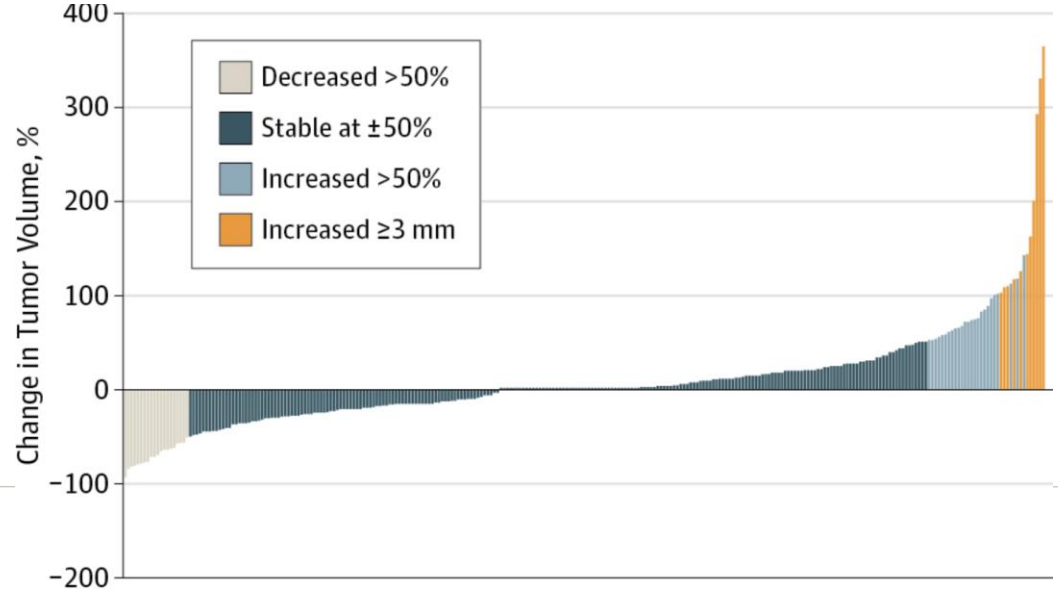
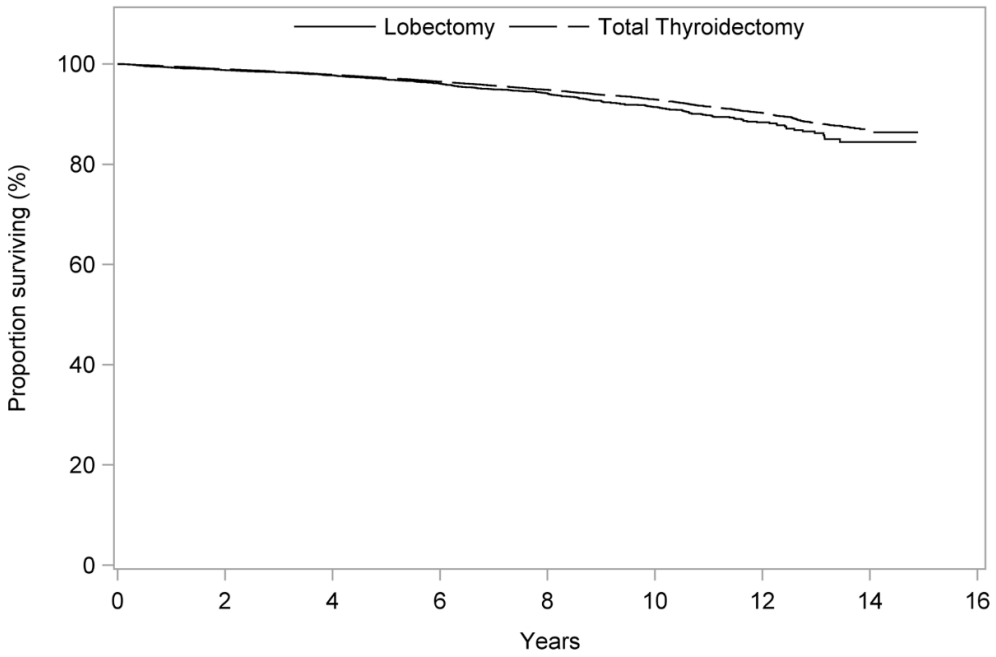
PMCID: PMC5710258 PMID: 28859191

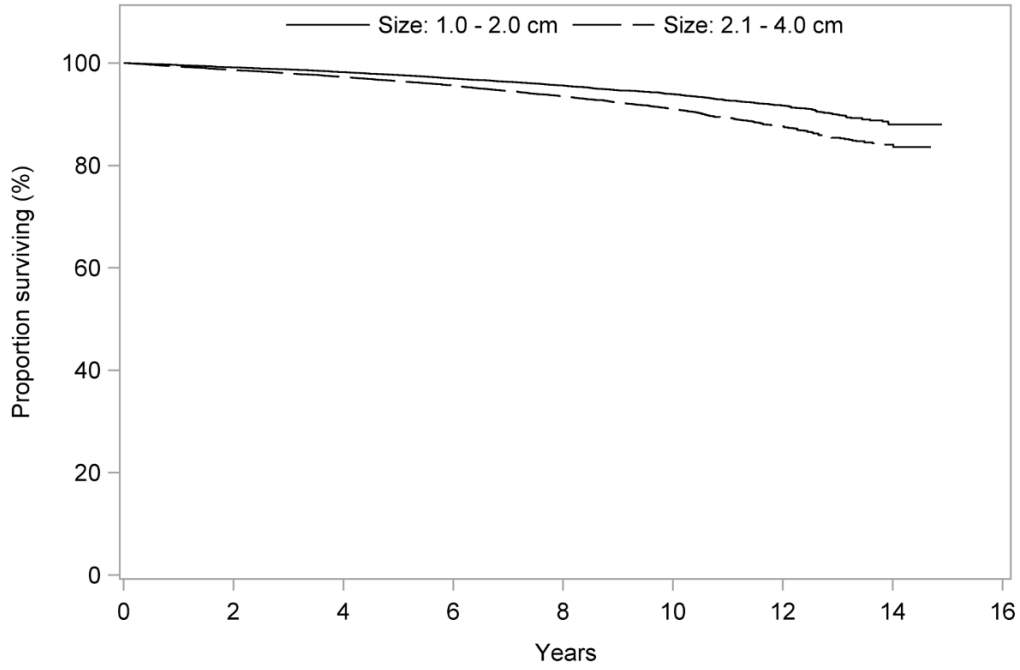




- tumor size 1.5 cm or less in maximal dimension at diagnosis
- U/S examinations by Memorial Sloan Kettering Cancer Center radiologists every 6 months for 2 years, then yearly
- 291 patients with low-risk PTC were followed with active surveillance for a median of 25 months (range, 6-166 months)
- Tumor diameter growth of 3 mm or more was observed in 11 of 291 (3.8%) patients. The cumulative incidence of growth of 3 mm or more was 2.5% at 2 years and 12.1% at 5 years. The cumulative incidence of volume increase greater than 50% was 11.5% at 2 years and 24.8% at 5 years
- Volume increased by more than 50% in 36 patients, was stable in 229 patients, decreased by more than 50% in 19 patients, and could not be determined in 7 patients

Extent of surgery does not affect survival for intermediate sized tumors



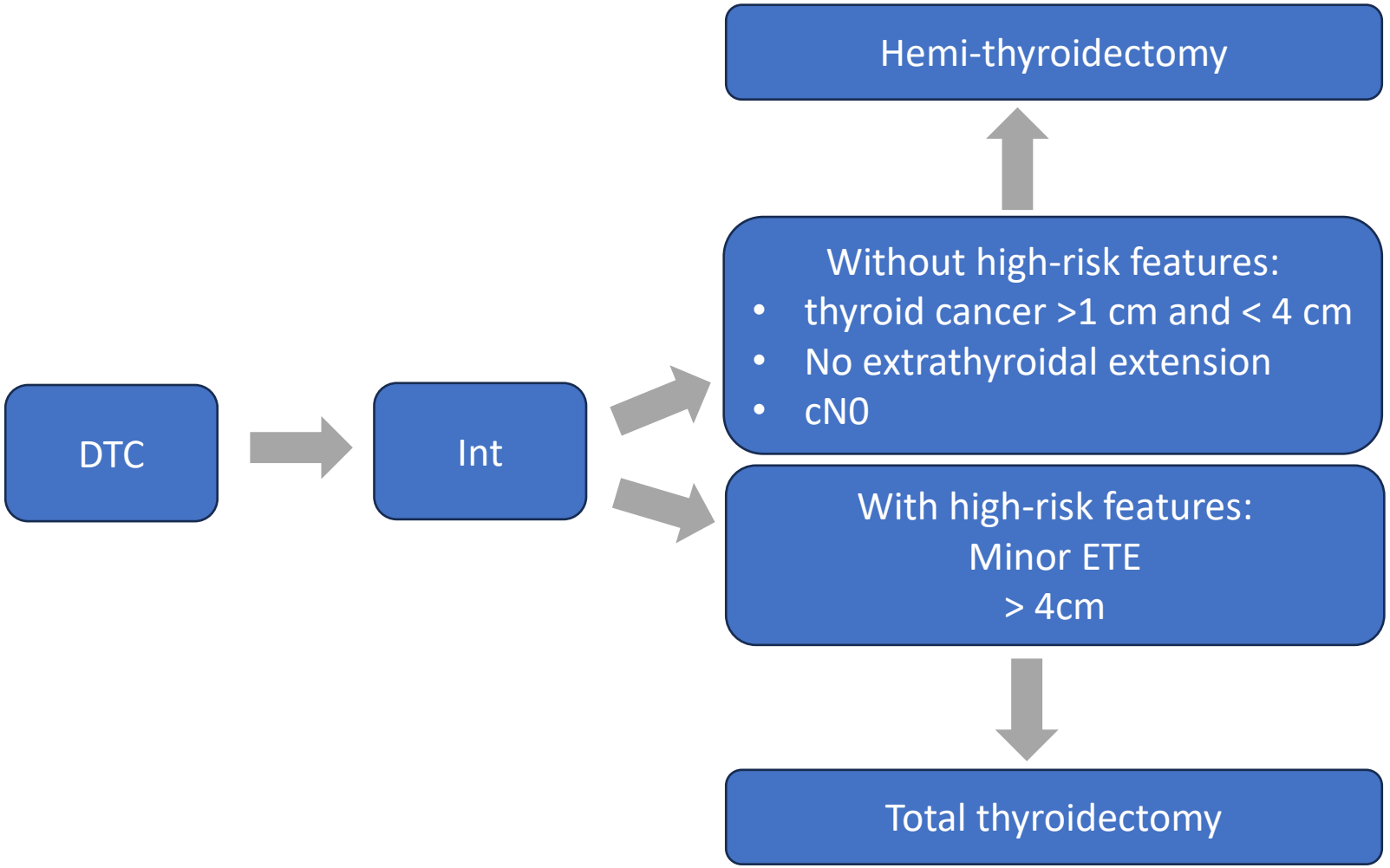


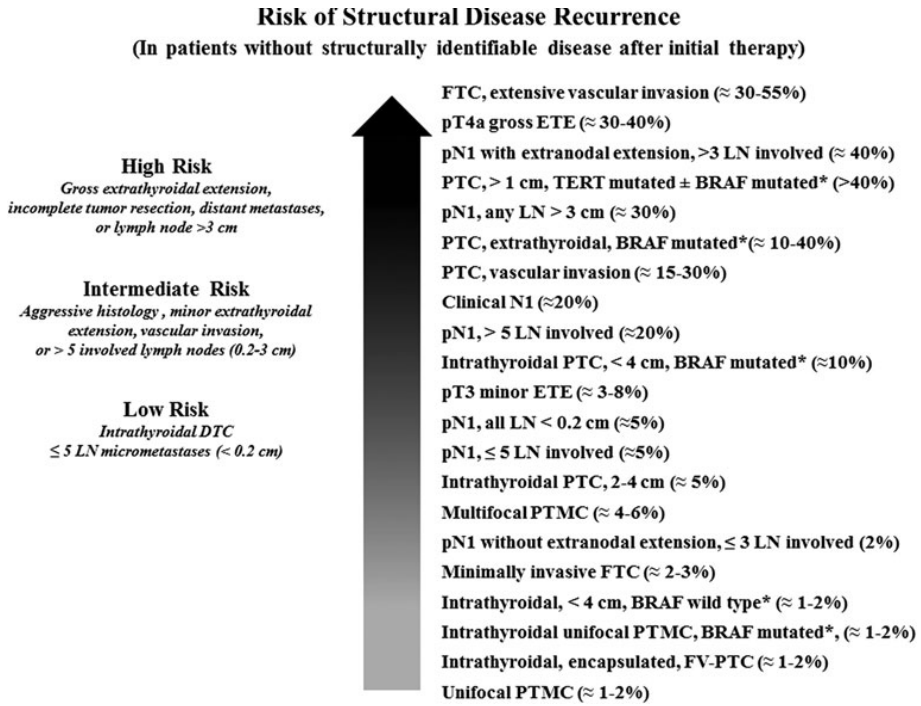
› Ann Surg. 2014 Oct;260(4):601-5; discussion 605-7. doi: 10.1097/SLA.0000000000000925.

Extent of surgery for papillary thyroid cancer is not associated with survival: an analysis of 61,775 patients

Mohamed Abdelgadir Adam [1], John Pura, Lin Gu, Michaela A Dinan, Douglas S Tyler, Shelby D Reed, Randall Scheri, Sanziana A Roman, Julie A Sosa

Risk Based Approach for DTC





Haugen et al. ATA Guidelines 2015

When to consider total thyroidectomy

- **RECOMMENDATION 35**

  (A) For patients with thyroid cancer >4 cm, or with gross extrathyroidal extension (clinical T4), or clinically apparent metastatic disease to nodes (clinical N1) or distant sites (clinical M1), the initial surgical procedure should include a near-total or total thyroidectomy and gross removal of all primary tumor unless there are contraindications to this procedure.

  (Strong recommendation, Moderate-quality evidence)

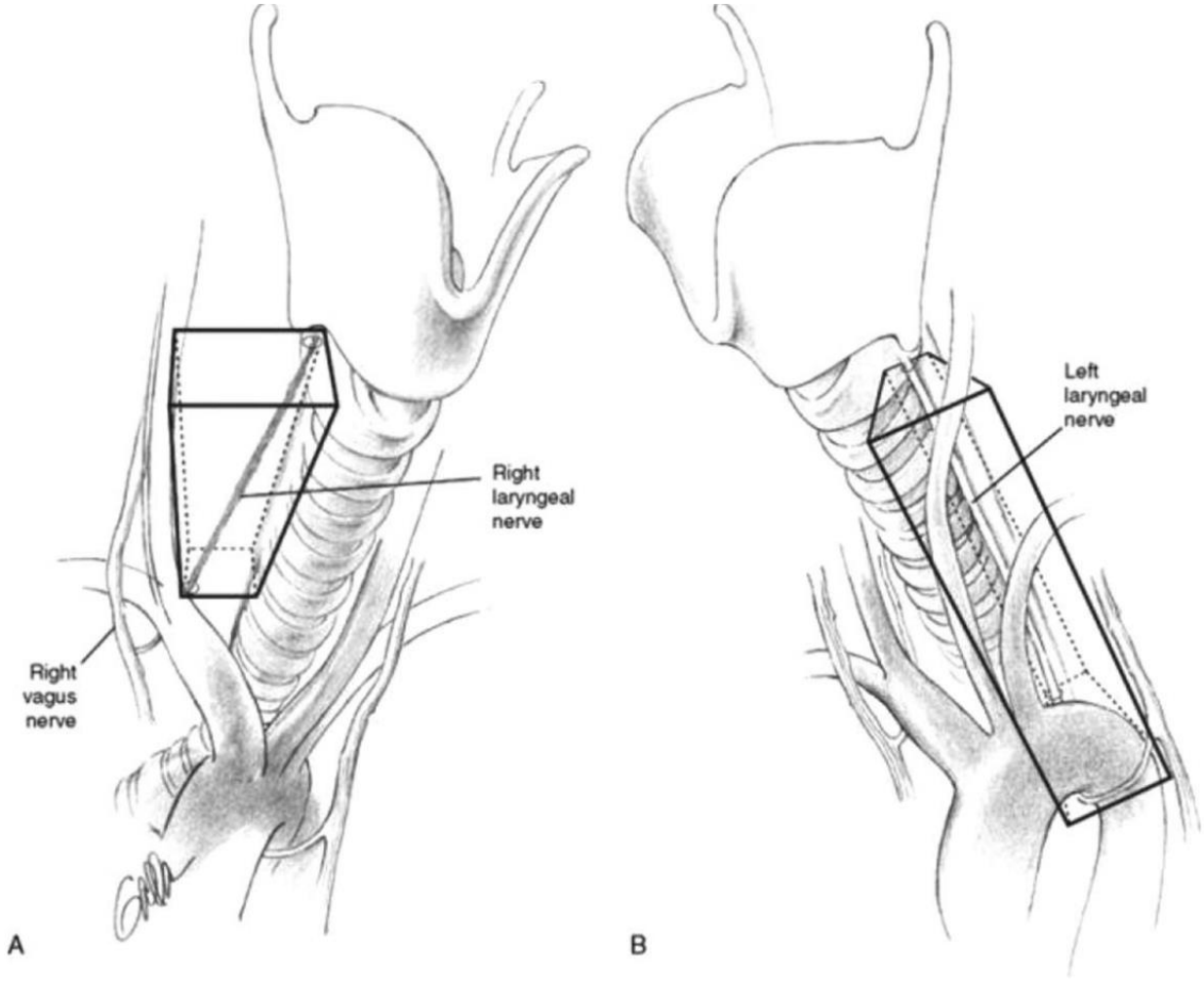
Haugen et al. ATA Guidelines 2015

Central Compartment

- Pro Central compartment
  - Reduces local recurrence
  - Accurately stage the disease
  - Equivalent long term vocal cord palsy rates
- Against Central compartment
  - Does not affect long term survival
  - Increased risk of hypocalcemia
  - Increased short term vocal palsy rate
  - Rarely alters treatment plan

Central Compartment

Border	Surgical anatomic landmark
Superior	Horizontal line at the inferior border of the cı and RLN insertion point
Inferior	The plane on level with the innominate arter
Posterior	Prevertebral fascia
Anterior	Sternothyroid muscle
Lateral	Common carotid artery
Medial*	Medial edge of contralateral strap muscles



Haugen et al. ATA Guidelines 2015
Agrawal et al. Head & Neck 2017

Central Compartment

- **Therapeutic central compartment** dissection for patients with clinically involved central nodes with total thyroidectomy
- **Prophylactic central compartment dissection** should be considered in patients with PTC with cN0 who have advanced primary tumors (T3 or T4) or those with lateral neck nodes (cN1b), or if the information will help determine RAI
- **Thyroidectomy without prophylactic central neck dissection** (T1 or T2), noninvasive, cN0 and for most follicular cancers

Surgery for advanced thyroid cancers

- When technically feasible, surgery for aerodigestive invasive disease is recommended

Workup for advanced thyroid cancers

- Nasopharyngoscopy for vocal cord function
- Cross sectional imaging
- Rule out distant metastasis
- MRI Brain
- Tracheoscopy/Bronchoscopy

Haugen et al. ATA Guidelines 2015
Shindo et al. Head & Neck 2014

TABLE 9. PREOPERATIVE FACTORS WHICH MAY BE ASSOCIATED WITH LARYNGEAL NERVE DYSFUNCTION

Factor	*Symptoms/signs*
History	Voice abnormality, dysphagia, airway symptoms, hemoptysis, pain, rapid progression, prior operation in neck or upper chest
Physical exam	Extensive, firm mass fixed to the larynx or trachea
Imaging	Mass extending to/beyond periphery of thyroid lobe posteriorly and/or tracheoesophageal infiltration, or bulky cervical adenopathy along the course of the RLN or vagus nerve

Head & Neck / Volume 36, Issue 10 / p. 1379-1390

AHNS Consensus Statement | Free Access

Management of invasive well-differentiated thyroid cancer: An American head and neck society consensus statement: AHNS consensus statement

Maisie L. Shindo MD, Salvatore M. Caruana MD, Emad Kandil MD, Judith C. McCaffrey MD, Lisa A. Orloff MD, John R. Porterfield MD, Ashok Shaha MD, Jennifer Shin MD ... See all authors

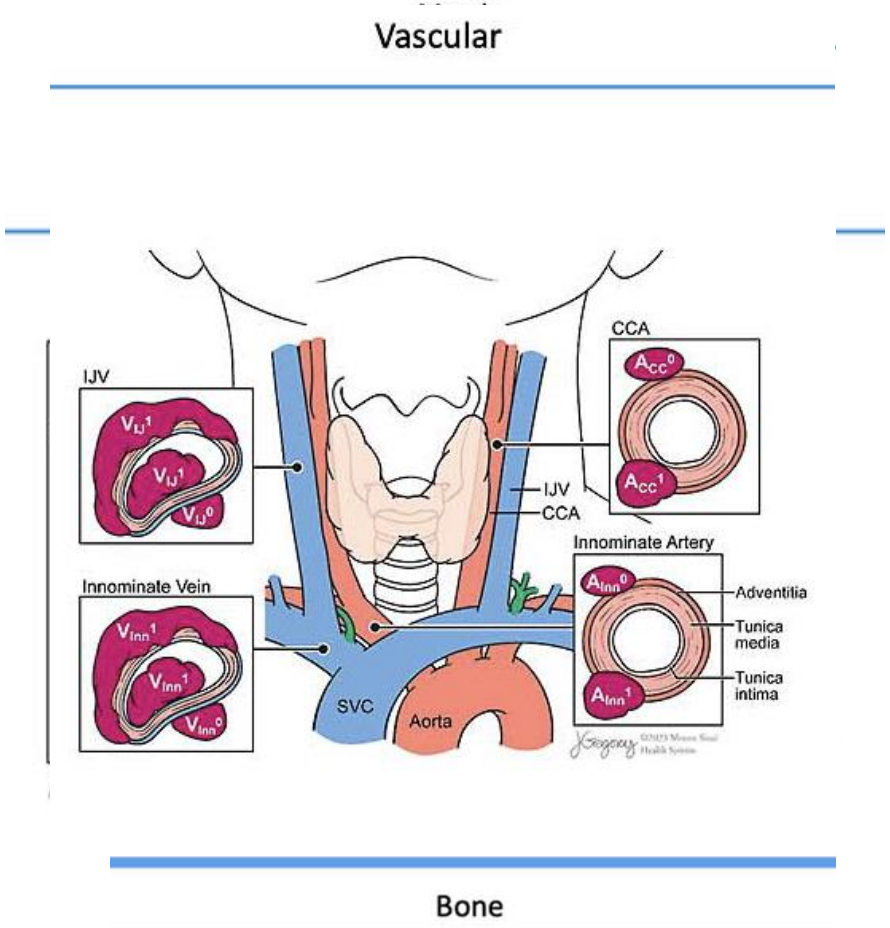
First published: 28 January 2014

Advanced thyroid cancers

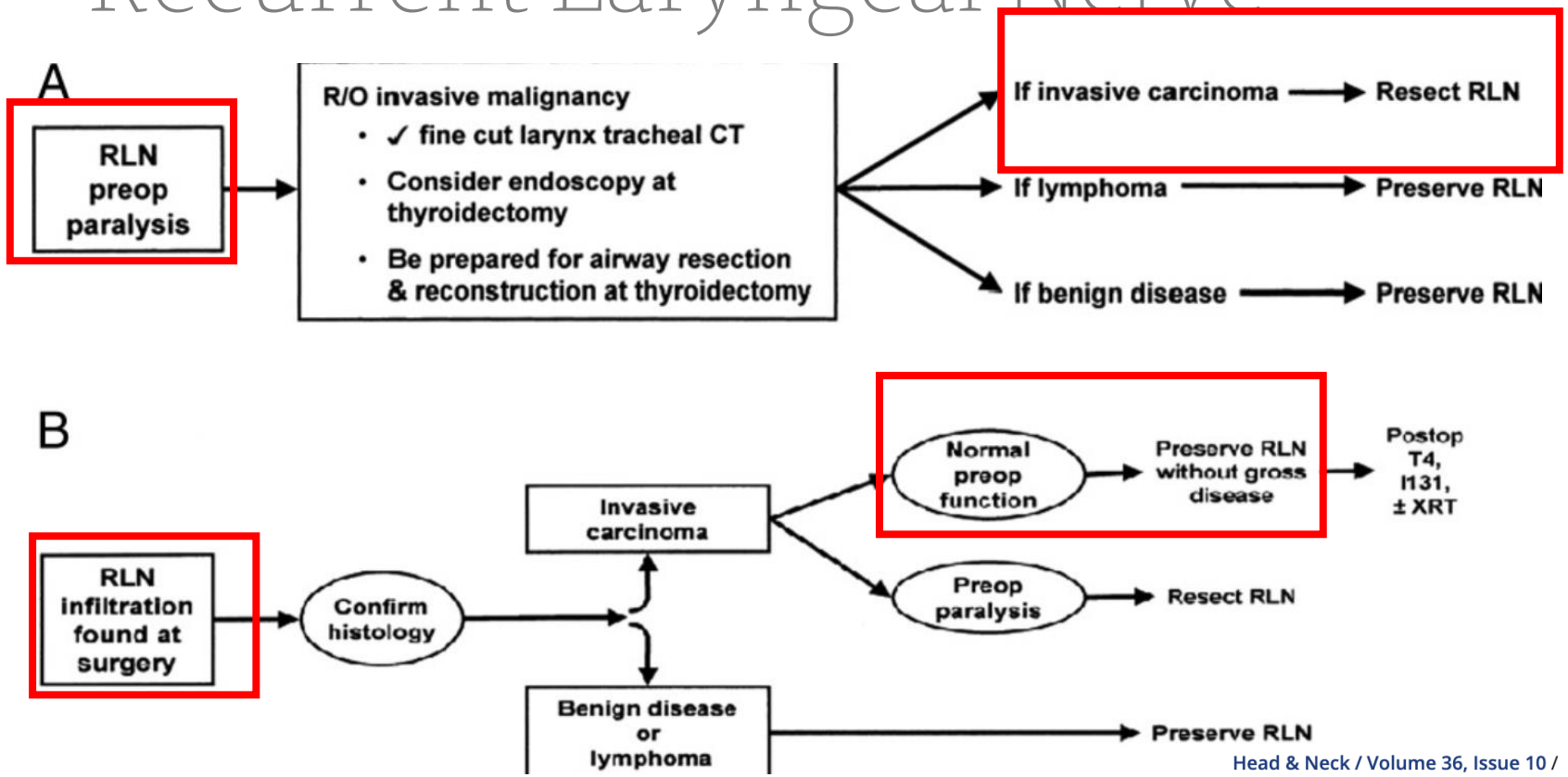
- Extrathyroidal extension
- Recurrent laryngeal invasion
- Tracheal invasion
- Esophageal invasion
- Vascular invasion

An anatomic checklist for accurate staging of grossly invasive thyroid cancer

Mark L Urken[1,2], Margaret Brandwein-Weber[3], Raymond L Chai[1,2], Mark Zafereo[4], Maisie Shindo[5], Joseph Scharpf[6], Jun Fan[3], Alex Silberzweig[2], Justin K Joseph[1,2], Ronald Ghossein[7], Ashok Shaha[8], Zubair Baloch[9] and R Michael Tuttle[10]



Recurrent Laryngeal Nerve



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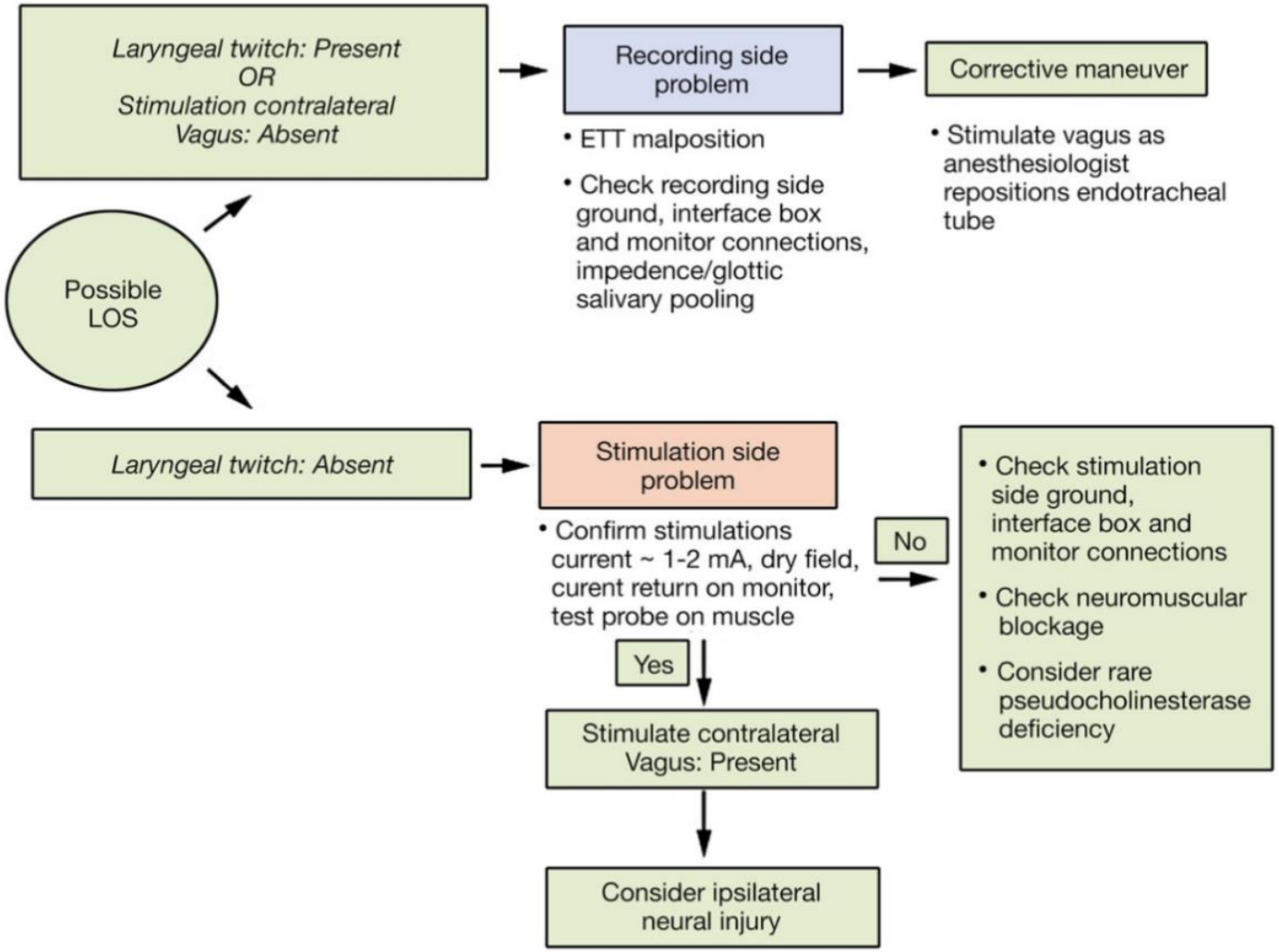
What happens when RLN signal is lost



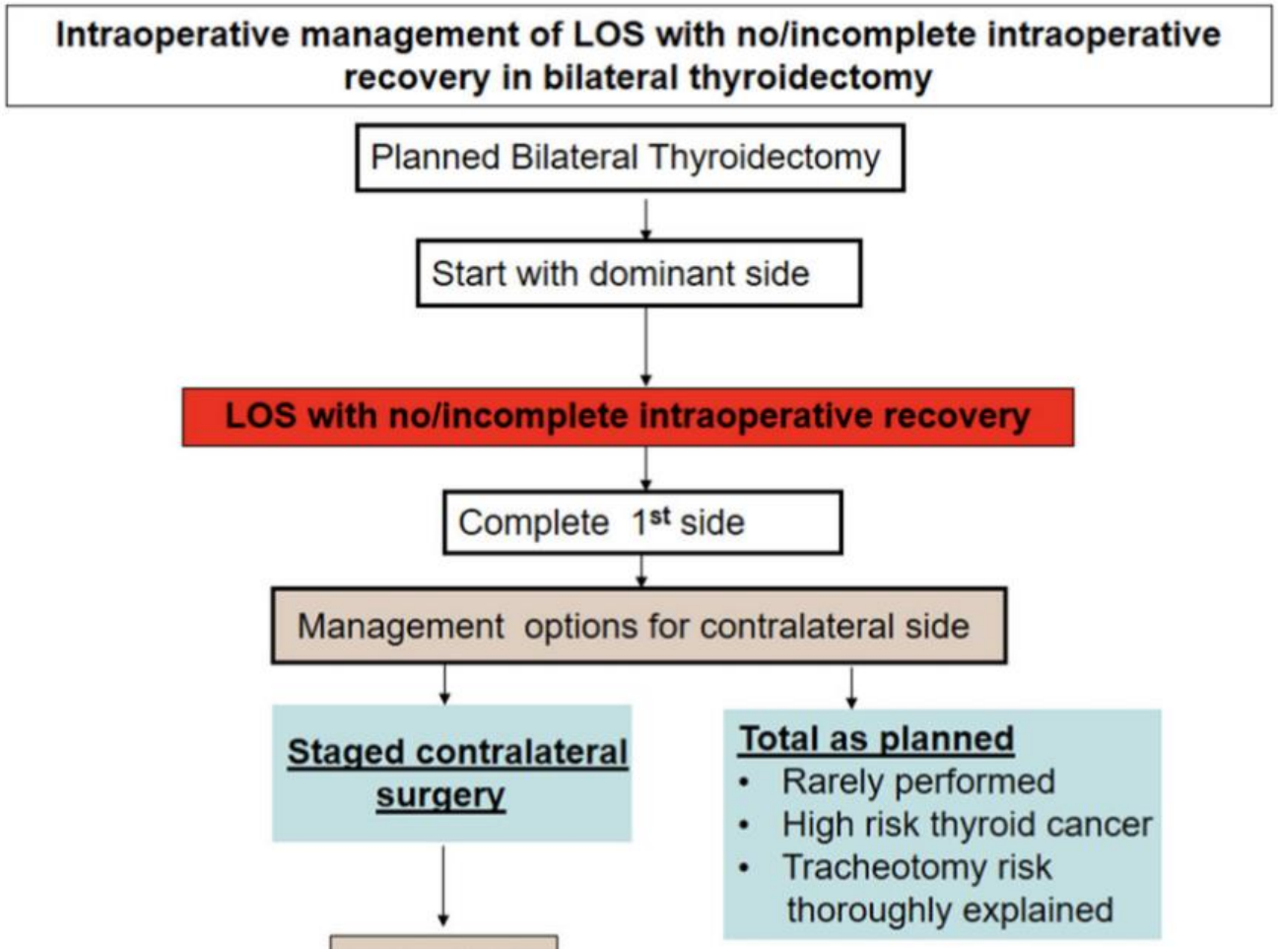
Contemporary Review

International neural monitoring study group guideline 2018 part I: Staging bilateral thyroid surgery with monitoring loss of signal

Rick Schneider MD, Gregory W. Randolph MD, FACS, FACE, Gianlorenzo Dionigi MD, FACS, Che-Wei Wu MD, PhD, Marcin Barczynski MD, PhD, FEBS-ES **... See all authors**

First published: 05 October 2018 | **https://doi.org/10.1002/lary.27359** | Citations: 163

What happens when RLN signal is lost



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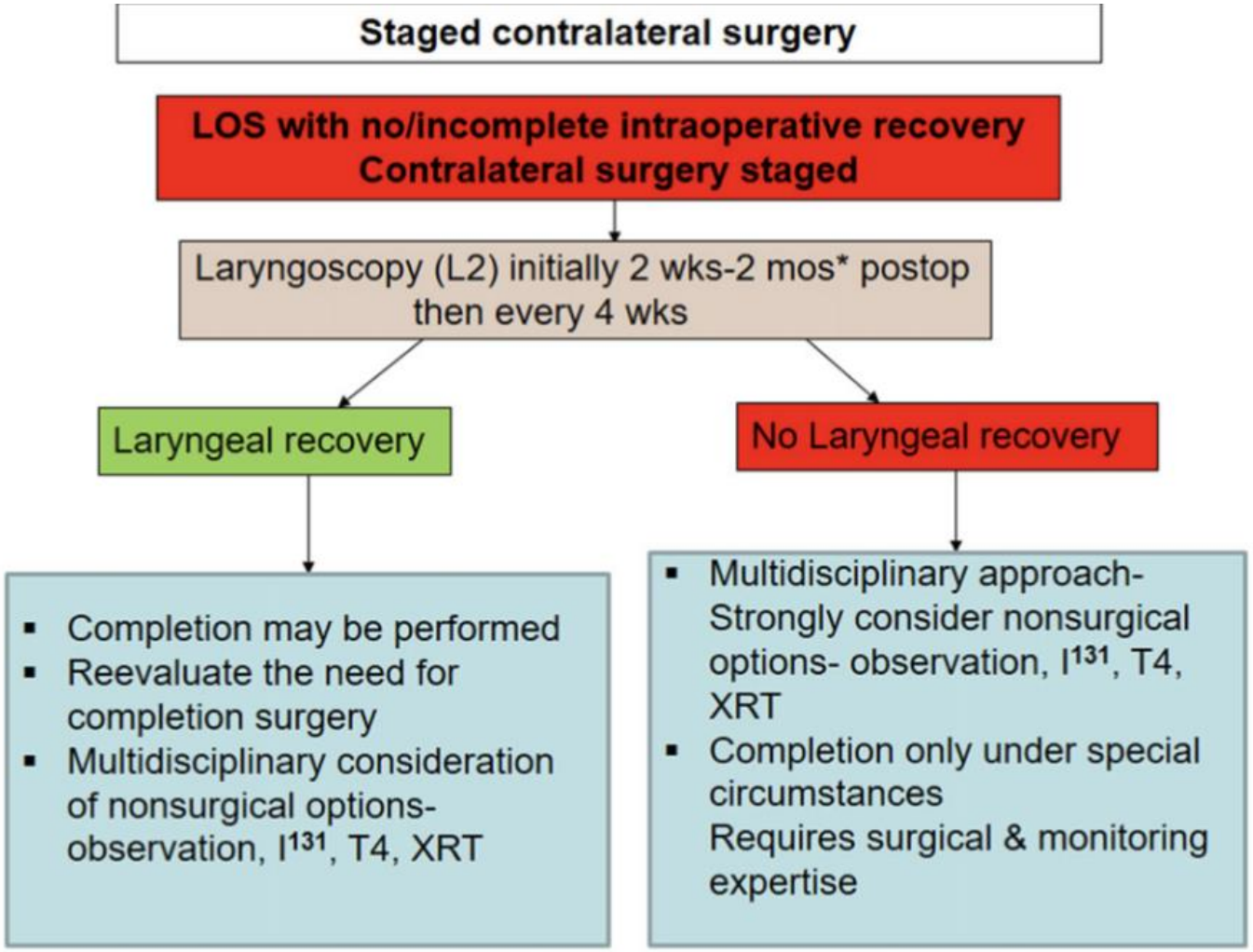

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Voice Reconstitution

- Ansa to RLN anastomosis
- Injection laryngoplasty
- Thyroplasty medialization

Surgical Management of Recurrent Disease

- Disease Considerations
  - Histology
  - Rate of Tg increase
  - Iodine avidity
  - Rate of growth
  - Invasion into adjacent structures
- Surgical Considerations
  - Comorbidities, age, patient preference
  - Other sites of metastases and their progression
  - Surgical history, laryngeal paralysis

- Goals of revision surgery
  - Remove any remaining native thyroid tissue
  - Resect locally recurrent cancer in the thyroid bed
  - Clear the involved nodal basins in compartmental fashion
  - Dissect nodal basins likely to harbor microscopic regional metastases

Head & Neck / Volume 38, Issue 12 / p. 1862-1869

Practice Guidelines | Free Access

Comprehensive management of recurrent thyroid cancer: An American Head and Neck Society consensus statement

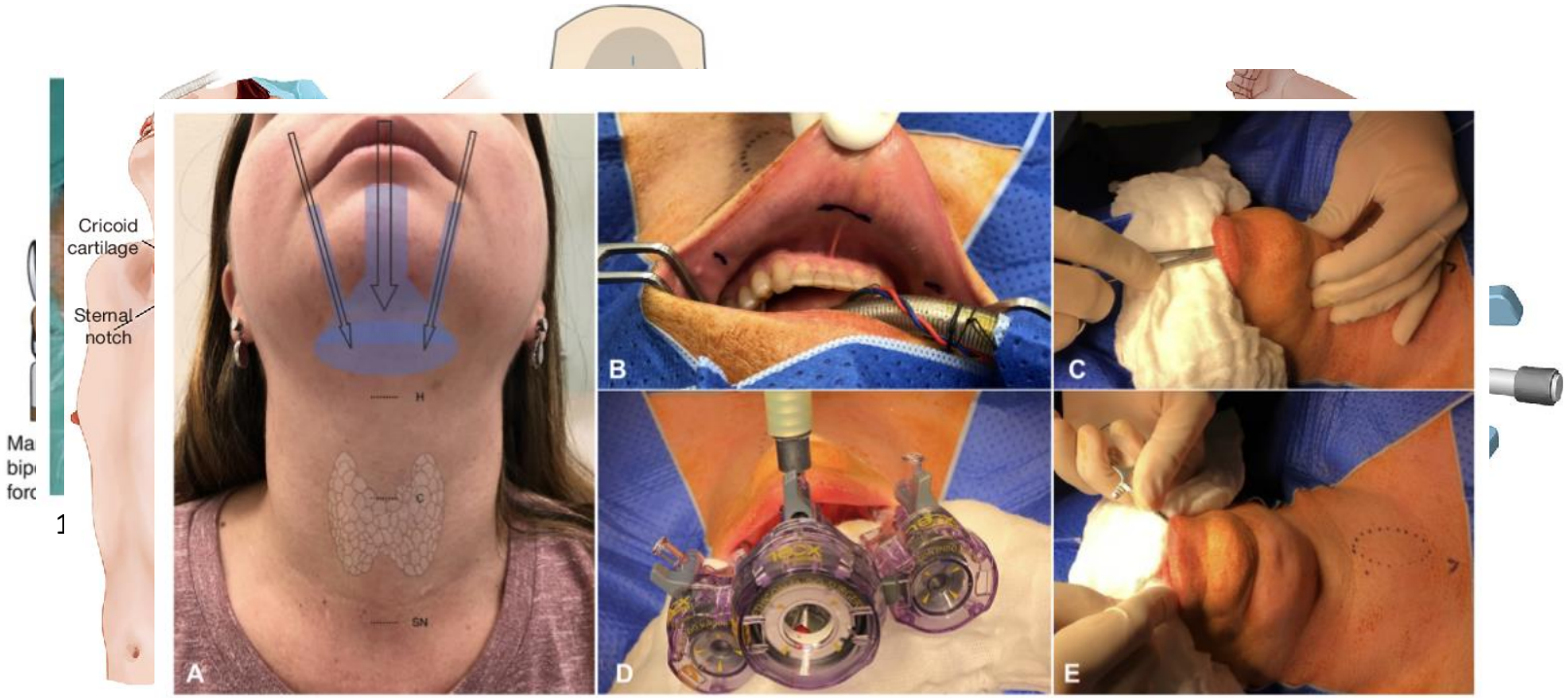
AHNS consensus statement

Joseph Scharpf MD, Michael Tuttle MD, Richard Wong MD, Drew Ridge MD, Russell Smith MD, Dana Hartl MD, Robert Levine MD, Gregory Randolph MD

First published: 22 September 2016

Minimally invasive approaches

- Bilateral Axillary Breast Approach
- Retroauricular/Facelift approach
- Trans-axillary
- Transoral approach



https://doi.org/10.1016/j.oraloncology.2020.104871

Targeted therapies

FREE ACCESS | HEAD AND NECK CANCER | May 15, 2023

Management of Advanced Thyroid Cancer: Overview, Advances, and Opportunities

Authors: Sarimar Agosto Salgado, MD, Erin Rachel Kaye, MD, Zoukaa Sargi, MD, MPH, Christine H. Chung, MD, and Maria Papaleontiou, MD AUTHORS INFO & AFFILIATIONS

Publication: American Society of Clinical Oncology Educational Book • Volume 43 • https://doi.org/10.1200/EDBK_389708

TABLE 2. Summary of Systemic Targeted Therapies in Advanced Thyroid Cancer

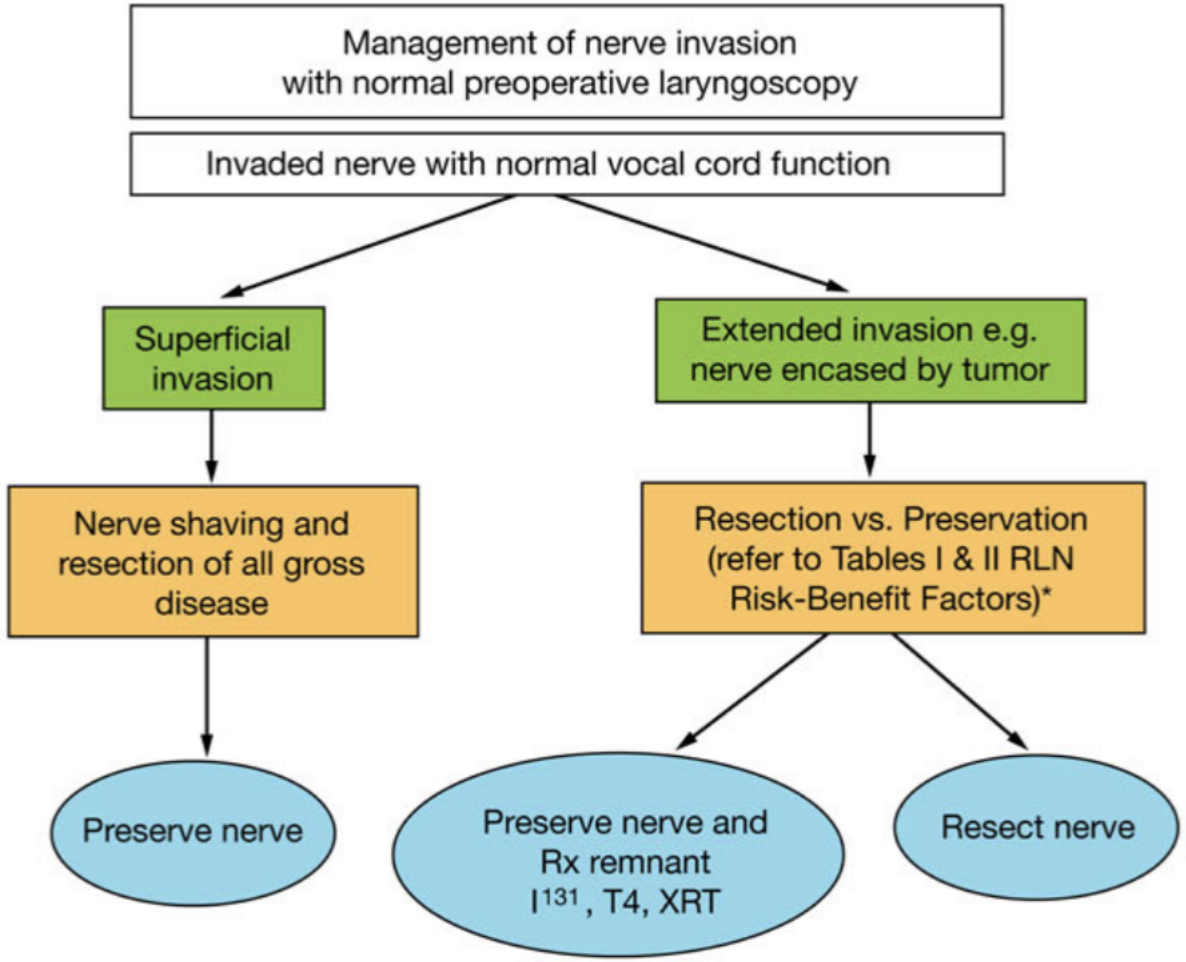
Targeted Therapy	Tumor Target	Response	Common Side Effects
Multikinase inhibitors-DTC			
Sorafenib	VEGFR, PDGFR, RET	PFS, 10.8 months ORR, 12%	Hand-foot, diarrhea, alopecia, rash, fatigue, weight loss, HTN
Lenvatinib	VEGFR, PDGFR, RET, FGFR	PFS, 18.3 months ORR, 64.8%	HTN, diarrhea, fatigue, decreased appetite, weight loss, nausea
Multikinase inhibitors-MTC			
Vandetanib	RET, VEGFR, EGFR	ORR, 45%	Diarrhea, rash, HTN, nausea, headache
Cabozantinib	RET, VEGFR, c-MET		Diarrhea, HTN, hand-foot syndrome
BRAF/MEK inhibitors			
Dabrafenib and trametinib	BRAF V600E	DTC: dabrafenib alone ORR, 42% *v* dabrafenib plus trametinib ORR, 48% ATC: ORR, 61%	Fever, fatigue, nausea, chills, skin toxicities (rash, skin cancers)
RET inhibitors			
Selpercatinib	RET	*RET* fusion-TC (previously treated) ORR, 79% *RET*-mutant MTC (no previous treatment) ORR, 73% *RET*-mutant MTC (previously treated) ORR, 69%	Dry mouth, gastrointestinal side effects, elevated liver enzymes, QT prolongation
Pralsetinib	RET	*RET* fusion-TC ORR, 85.7% *RET*-mutant MTC (no previous treatment) ORR, 71% *RET*-mutant MTC (previously treated) ORR, 60%	Dry mouth, gastrointestinal side effects, elevated liver enzymes, QT prolongation
NTRK inhibitors			
Larotrectinib	NTRK	*NTRK* fusion-TC ORR, 71%	Myalgia, fatigue, elevated liver enzymes, edema, gastrointestinal side effects

Abbreviations: ATC, anaplastic thyroid cancer; DTC, differentiated thyroid cancer; EGFR, epidermal growth factor receptor; FGFR, fibroblast growth factor; HTN, hypertension; MTC, medullary thyroid cancer; ORR, overall response rate; PDGFR, platelet-derived growth factor α; PFS, progression-free survival; RET, rearranged during transfection; TC, thyroid cancer; VEGFR, vascular epithelial growth factor receptor.

Summary

- Surgery remains the mainstay for thyroid cancer
- For early stage disease – hemi-thyroidectomy maybe sufficient
- For advanced disease – macroscopic resection is a reasonable approach with preservation of key structures if possible
- Evolving role of neoadjuvant therapy in advanced disease
- Non-surgical and minimally invasive approaches is an evolving area

Management of nerve invasion



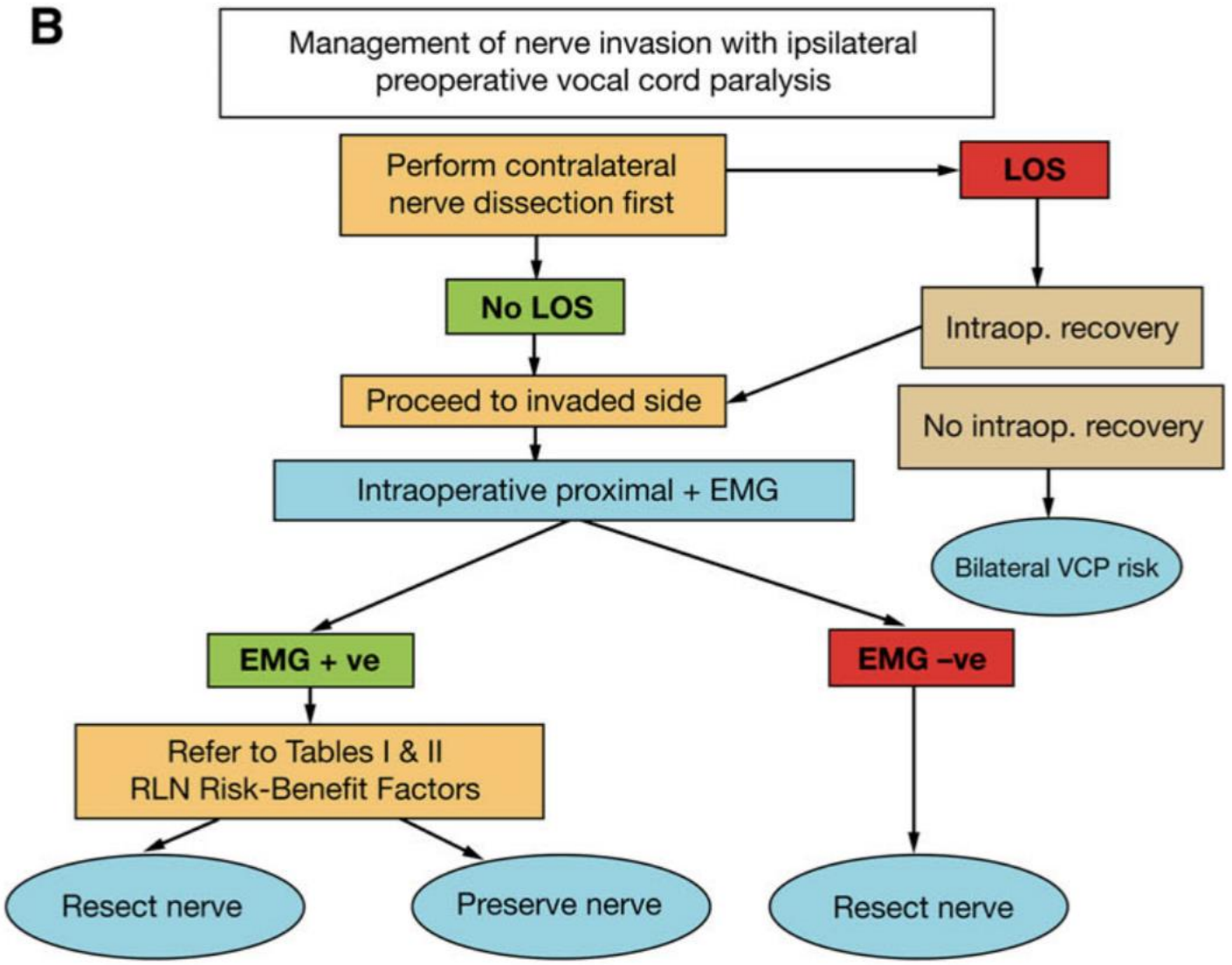
Contemporary Review

International neuromonitoring study group guidelines 2018: Part II: Optimal recurrent laryngeal nerve management for invasive thyroid cancer—incorporation of surgical, laryngeal, and neural electrophysiologic data

Che-Wei Wu MD, PhD, Gianlorenzo Dionigi MD, FACS, Marcin Barczynski MD, PhD, FEBS-ES, Feng-Yu Chiang MD, Henning Dralle MD, FRCS, FACS, FEBS ... See all authors

First published: 06 October 2018 | https://doi.org/10.1002/lary.27360 | Citations: 117

Management of nerve invasion



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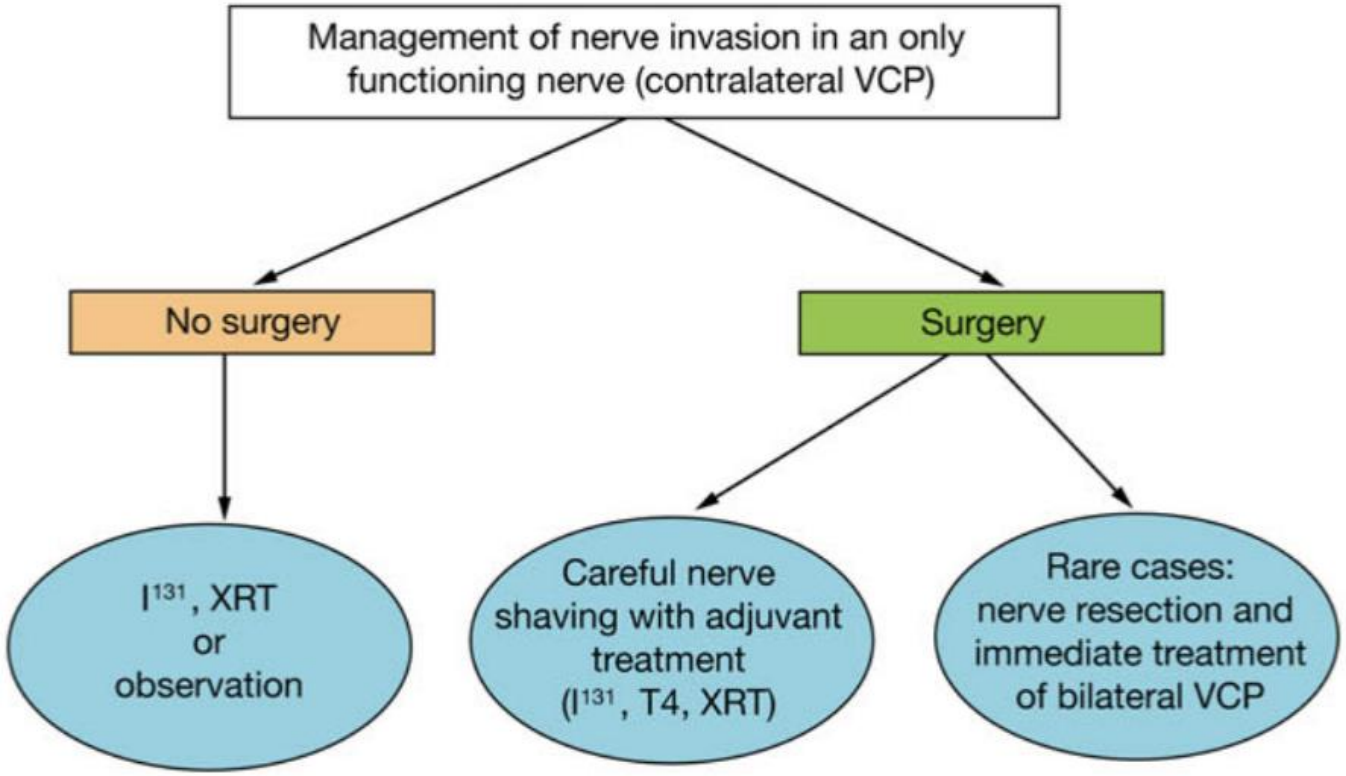

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