

Jennifer A. Brooks*, MD, MPH, Adithya Srikanthan*, BS, Amr H. Abdelhamid Ahmed, MBBCH, MMSc, Bo Wang, MD, PHD, Marika D. Russell, MD, Gregory W. Randolph, MD
¹Department of Otolaryngology, University of Rochester, ²Department of Otolaryngology, Massachusetts Eye and Ear, ³Fujian Medical University Union Hospital

Introduction

- Recurrent laryngeal nerve (RLN) is a frequent site of extrathyroidal extension in advanced differentiated thyroid cancer.^{1,2}
- Extrathyroidal extension into the RLN has been thought to have prognostic implications.³
- Compromising RLN integrity can lead to dysphonia, swallowing difficulty, and airway compromise.³
- The optimal surgical management of invaded RLNs requires investigation.

Methods and Materials

- **Study Design:** Retrospective cohort study at a tertiary care academic center
- **Inclusion Criteria:** Patients who underwent surgery for differentiated thyroid carcinoma, with and without recurrent laryngeal nerve invasion from 1995-2015
- **Primary Outcome:** Survival outcomes at 5 and 10 years
- **Statistical Analysis:** t-tests, Mann-Whitney tests, chi-square, Fisher's Exact, Kaplan-Meier Survival analysis, and univariate/multivariate regression analysis

Results

Characteristics	No. (%)		P
	Invaded group N=59	Control group N=280	
RLN resected	42/59 (71.2)	0/258 (0.0)	<0.0001
Tumor Left on RLN	15/59 (25.4)	0/258 (0.0)	<0.0001
Pathologic Diagnosis			<0.0001
PTC	52/59 (88.1)	247/250 (98.8)	
FTC	7/59 (11.9)	1/250 (0.4)	
Lymph Nodes Positive for Metastasis/Patient (N, median (IQR))*	4 (0-10)	0 (0-1)	0.0059
Patients with Documented Nodal Metastasis	38/54 (81.8)	81/230 (35.2)	<0.0001

Table 1: Intraoperative findings in the Invaded and Control groups

Results

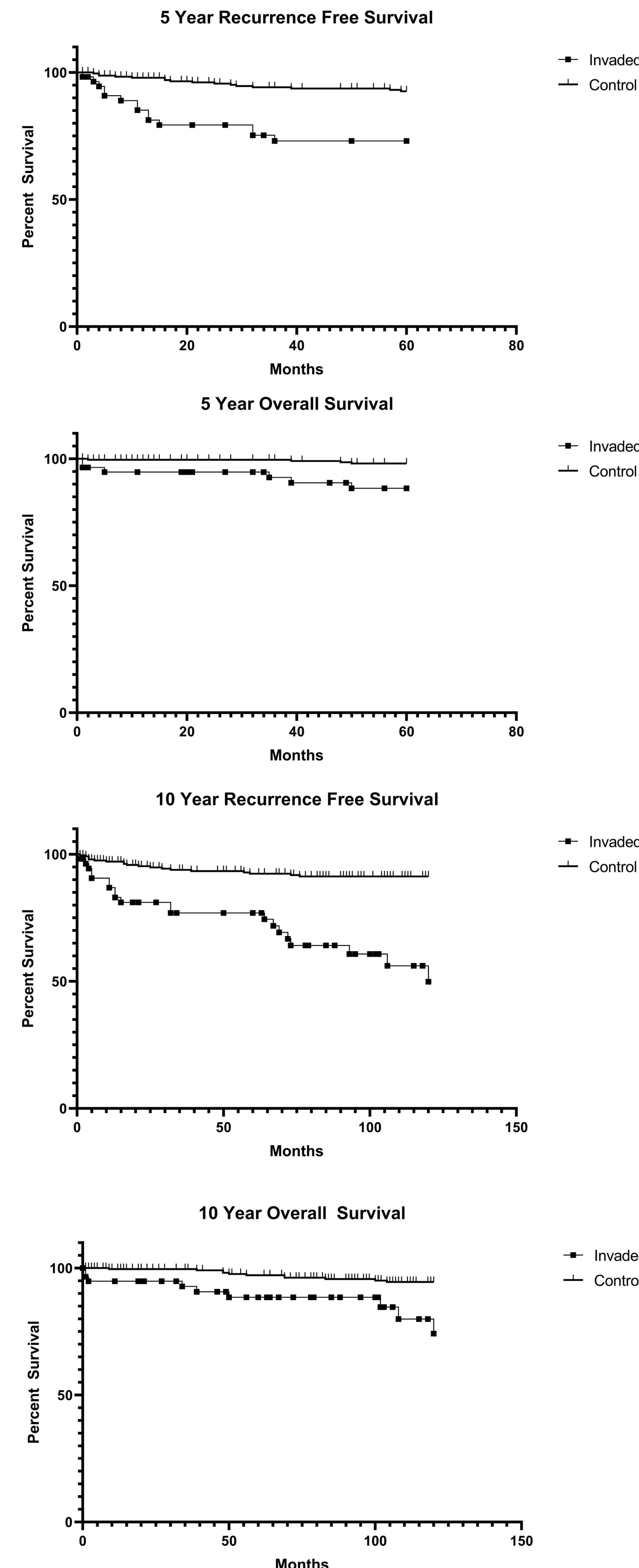


Figure 1: Survival outcomes between invaded and control group patients

Results

Characteristics	No. (%)		P
	Invaded group	Control group	
Postoperative Radiotherapy	18/57 (31.6)	4/246 (1.6)	<0.0001
Postoperative Radioactive Iodine (RAI)	42/57 (73.7)	140/248 (56.5)	0.0164
Postoperative RAI Dose, (mean ± SD)	157.8 ± 97.0	96.2 ± 39.7	<0.0001
Postoperative Chemotherapy	11/57 (19.3)	3/248 (1.2)	<0.0001
Locoregional Recurrence (LRR)	22/58 (37.9)	22/254 (8.7)	<0.0001
Time to LRR (months, median & IQR)	13 (4.5-50)	23 (6.75-57.5)	0.349
Distant metastasis	16/65 (24.6)	3/250 (1.2)	<0.0001

Table 2: Adjuvant Therapies received and Locoregional Recurrence throughout follow-up

Discussion

- Invaded group have worse recurrence free survival and overall survival at 5- and 10-year follow-up
- Invaded group had significantly higher rates of locoregional recurrence through through follow-up duration – reflection of aggressive disease state.
- Invaded patients required adjuvant therapy at higher rates.
- Limitations: Single center study

Conclusions

- RLN invasion is associated with greater disease burden, including larger tumor size and more nodal metastasis.
- RLN Invasion is associated with a generally more aggressive disease state with worse recurrence and survival outcomes.
- RLN invasion confers a greater need for adjuvant therapy.

Contact

Gregory W. Randolph, MD FACS FACE FEBS (Endocrine) MAMSE
 Department of Otolaryngology-Head and Neck Surgery,
 Massachusetts Eye and Ear Infirmary, Harvard Medical School,
 243 Charles Street, Boston, MA 02114
 Email: Gregory_Randolph@meei.harvard.edu; Phone: (617) 573-4115

References

1. McCaffrey TV et al. Locally Invasive Papillary Thyroid Carcinoma: 1940-1990. *Head & Neck* 1994; 16: 165-172.
2. Wu CW et al. International neuro-monitoring study group guidelines 2018: Part II: Optimal recurrent laryngeal nerve management for invasive thyroid cancer-incorporation of surgical, laryngeal, and neural electrophysiologic data. *Laryngoscope*. 2018 Oct 6. doi: 10.1002/lary.27360. PMID: 30291765.
3. Shindo ML, Caruana SM, Kandil E, et al. Management of invasive well-differentiated thyroid cancer: an American Head and Neck Society consensus statement. *AHNS consensus statement*. *Head Neck*. 2014 Oct;36(10):1379-90. doi: 10.1002/hed.23619. Epub 2014 Aug 23. PMID: 24470171
4. Brooks JA, Abdelhamid Ahmed AH, Al-Qurayshi Z, et al. Recurrent Laryngeal Nerve Invasion by Thyroid Cancer: Laryngeal Function and Survival Outcomes. *Laryngoscope*. 2022 Nov;132(11):2285-2292. doi: 10.1002/lary.30115. Epub 2022 Apr 1. PMID: 35363394.