

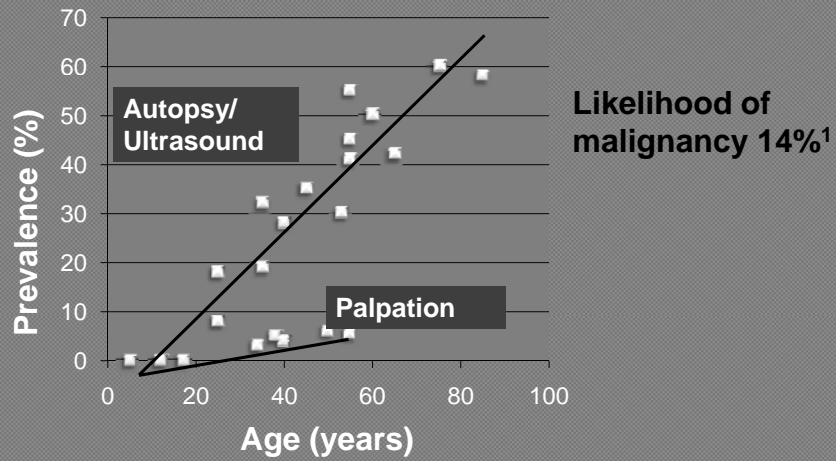
New Perspectives in Thyroid Cancer

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Division of Endocrinology
The Ohio State University

Outline

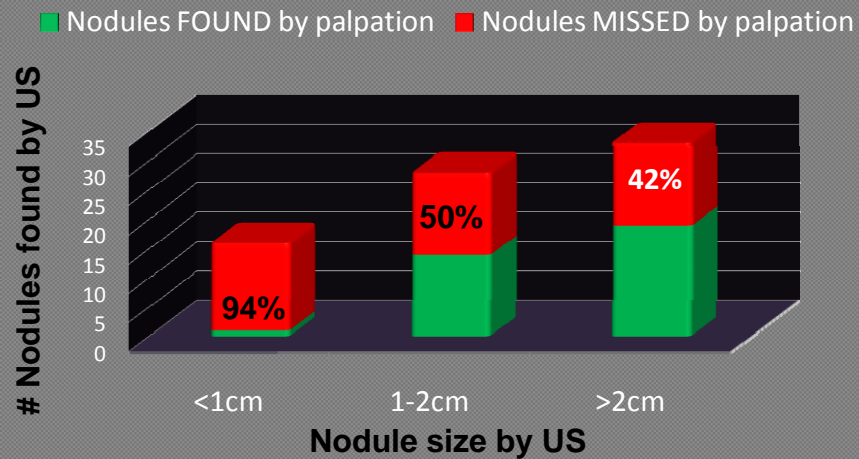
- **Thyroid Nodules**
- **Thyroid Cancer Epidemiology**
- **Initial management**
- **Long-term follow up**
- **Disease-free status**

Incidence of thyroid nodules



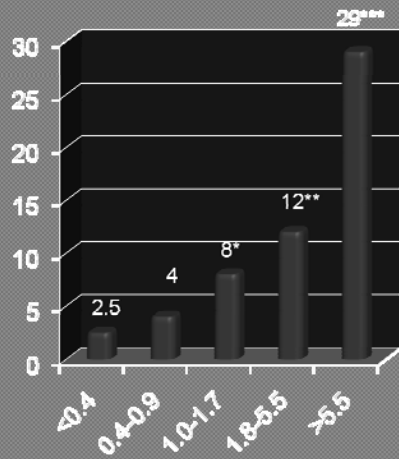
Mazzaferri 1993 NEJM 328 (8): 553-9 ¹ Yassa 2007 Cancer Cytopathology 111:508-16

How good are we at finding nodules? Ultrasound vs. Palpation



Brander 1992 J Clin Ultrasound 20: 37-42

TSH predicts malignancy risk and cancer stage



TNM stage	No. of patients	Mean TSH	<i>p</i> value
I and II	204	2.1±0.24	0.002
III and IV	35	4.9±1.59	

* $p < 0.05$
 ** $p < 0.01$
 *** $p < 0.001$

Boelaert 2006 JCEM 91:4295-4301

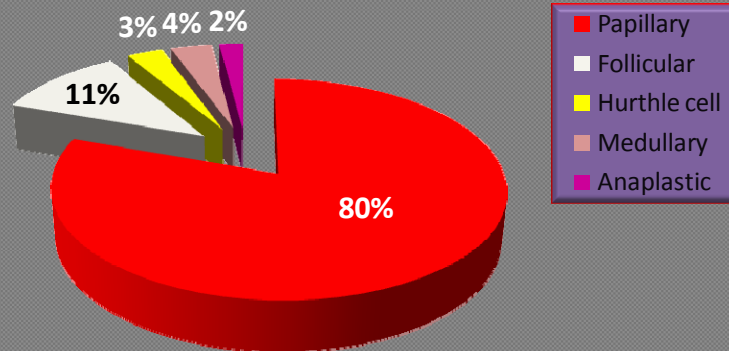
Haymart, et al. JCEM, March 2008, 93(3):809-814

FNA Cytology Diagnostic Categories

National Cancer Institute Classification	Alternate classification	% Malignant
Benign		<1%
Follicular Lesion of Undetermined Significance	Atypia	5-10%
Neoplasm	Follicular Neoplasm Hurthle Neoplasm	20-30%
Suspicious for malignancy		50-75%
Malignant		98-100%
Non-diagnostic	Unsatisfactory	

Baloch ZW., 2008 Diag Cytopath 36:425-437

Percentages of thyroid carcinoma by histologic subtype



Hundahl 1998 Cancer 83: 2368-48

Epidemiology of Thyroid Cancer

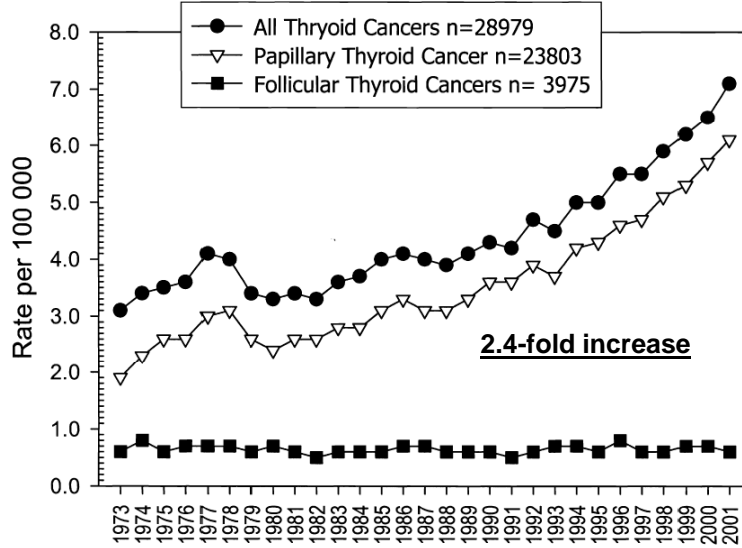
- 48,020 new cases in 2011
- 1,740 deaths
- Females 5 year survival rates increasing significantly, from 93% in 1974 to 97.4% in 2001
- Survival rates in men have decreased significantly, by 2.4%
- Rates of distant metastases in men were over 2-fold higher than women (9% vs 4%)

Cancer Facts and Figures 2011

National Cancer Institute, <http://www.cancer.gov/cancertopics/types/thyroid>

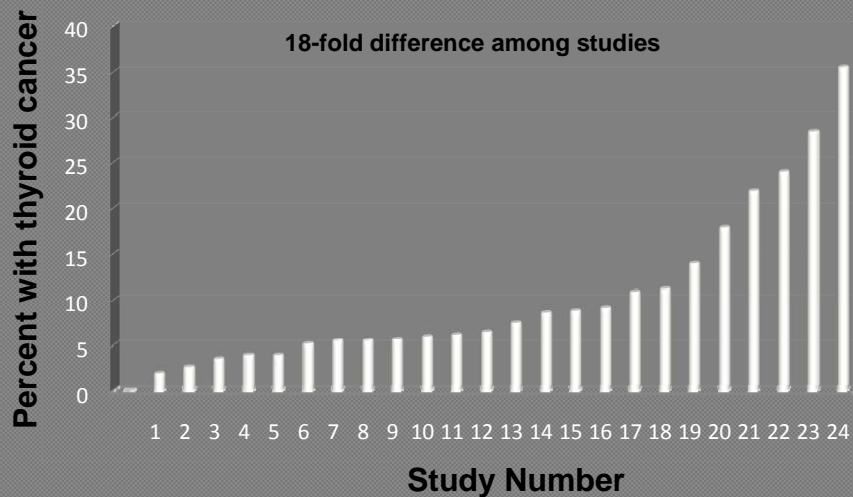
SEER Cancer Statistics Review, 1975-2001. http://seer.cancer.gov/csr/1975_2008/.

Annual Incidence Rate of Thyroid Cancer in the United States from 1973 to 2001



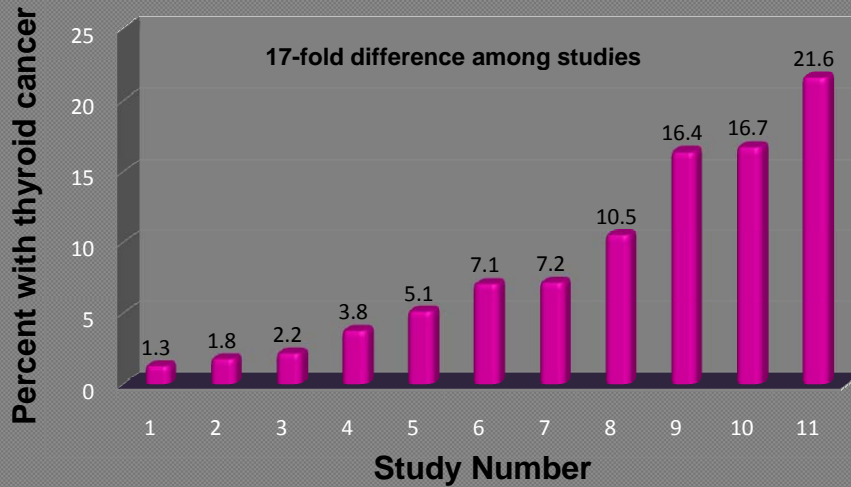
Sipos, Mazzaferri. 2010 Clinical Oncology 22: 395-404

The prevalence of microcarcinoma in 24 autopsy series with 7,156 cases



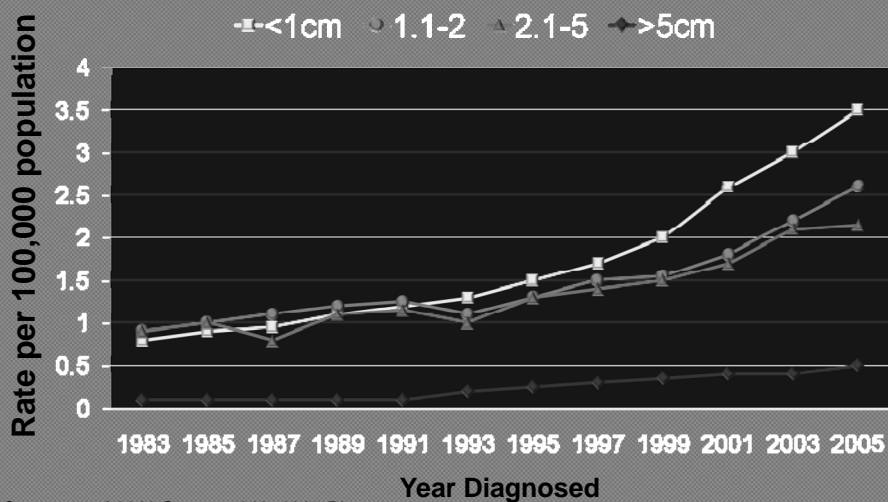
Adapted from: Pazaitou-Panayiotou, et al. 2007 Thyroid 17 (11): 1085-92

The Prevalence of PTMC in 11 Surgical Series with 6,942 Cases



Adapted from: Pazaitou-Panayiotou, et al. 2007 Thyroid 17 (11): 1085-92

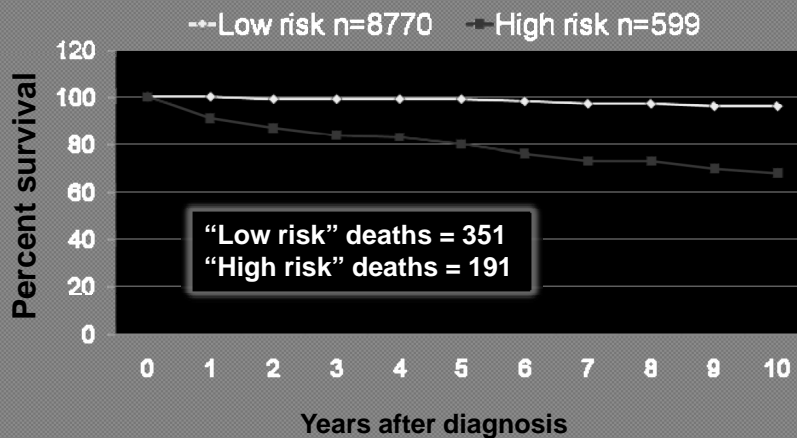
Incidence rates of PTC by tumor size



Cramer et al 2010 Surgery 148: 1147-52

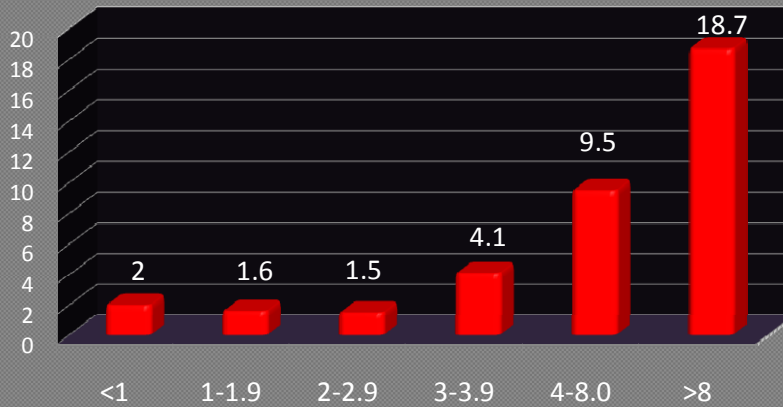
Mortality and Recurrence Rates for Thyroid Cancer

Relative survival of papillary thyroid carcinoma by AMES risk levels



Hundahl et al 1998 Cancer 83: 2638

Ten year mortality by tumor size

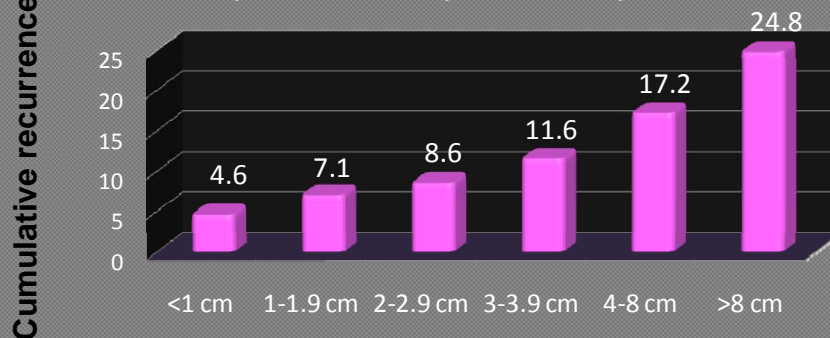


Bilimoria 2007. Annals Surg 207: 375-84

10 Year recurrence rates by tumor size

52,173 patients with papillary thyroid cancer

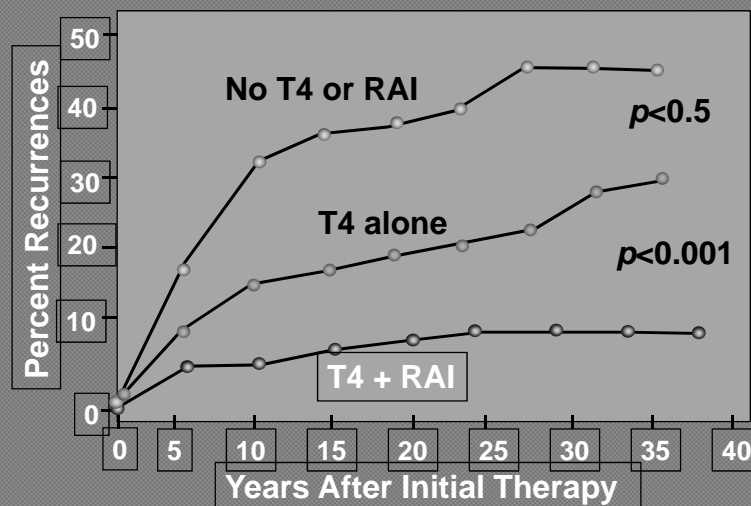
$p < 0.001$ for each pair-wise comparison



Bilimoria 2007 Ann Surg 246: 375

Initial Treatment and Long-Term Management

Recurrence Rates as a Function of Treatment



Mazzaferri 1994 Am J Medicine

Levels of TSH Suppression

Disease Status	TSH (mU/L)	Duration of Therapy	Strength of evidence
Persistent Disease	<0.1	Indefinitely in absence of contraindications	B
NED; High risk tumor	0.1-0.5	10 years then low risk range	C
NED; Low risk tumor	0.3-2.0	Indefinite in absence of recurrence	B

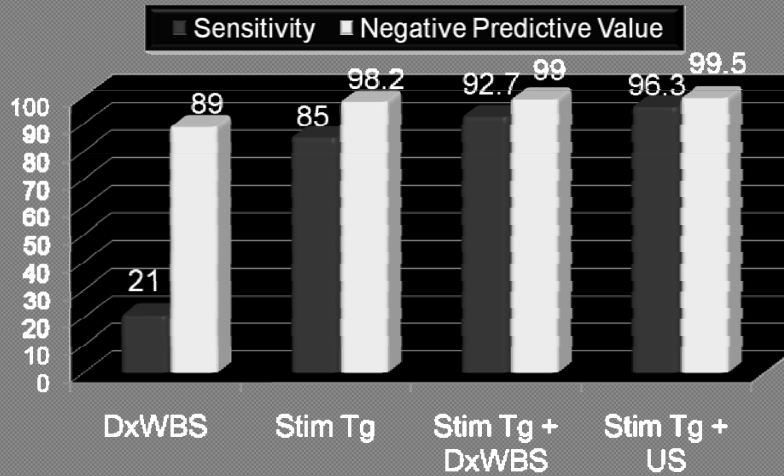
Derived from: Cooper et al. 2009 Thyroid 12: 1-48

Role of Thyroglobulin in Diagnostic F/U

- Important modality to monitor patients for residual or recurrent disease
- In absence of antibody interference, Tg has high sensitivity and specificity to detect thyroid cancer
- Highest sensitivity is following thyroid hormone withdrawal or stimulation using rhTSH

Cooper, D. S., et. al. 2009 Thyroid 19(12) 1-48.

Diagnostic value of standard testing



Pacini 2003. JCEM 88 (8): 3668-3673.

Criteria for absence of persistent tumor

After total or near-total thyroidectomy and remnant ablation (RAI), disease-free status comprises ALL of the following:

1. No clinical evidence of tumor.
2. No imaging evidence of tumor.
3. Undetectable serum Tg levels during TSH suppression and stimulation in the absence of interfering antibodies.

Cooper, et al 2009 Thyroid 12: 1-48

Contemporary Surgical Management of Differentiated Thyroid Cancer

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Outline

Preoperative Assessment

Risk Stratification

Goals

Surgical management

Neck Dissection

Complications and Minimizing Risks

Cases



Preoperative Assessment



Preoperative Assessment

- Risk stratification
- Preoperative counseling/informed consent based on risk stratification
- Known or suspected cancer: Ultrasound contralateral lobe, central and lateral
 - necks
- FNA suspicious nodes
- Routine use of MRI, CT, PET not needed

Cooper, et al 2009 Thyroid 19: 1167-1214.

Risk Stratification



Risk Stratification

Goal: place patient in a low or high risk category based on preoperative assessment

Example: Follicular or Hurthle cell neoplasm ~20% risk

High Risk Features

>4 cm

Atypical features or suspicious on FNA

Family history

Radiation exposure

Cooper, et al 2009 Thyroid 19: 1167-1214.



Surgical Goals



Goals Thyroid Cancer Surgery

Curative vs Palliative

Remove primary tumor

Remove disease extending outside primary

Remove all nodes involved

Staging

Facilitate postoperative RAI

Permit adequate surveillance (WBS + Tg)

Minimize disease recurrence and mets

Cooper, et al 2009 Thyroid 19: 1167-1214.

Extent of Surgery (lobectomy versus total)



Extent of Surgery

Thyroid lobectomy – initial approach

- Low risk undiagnosed tumors
- DTC <1 cm without contralateral nodules or nodes on US and no high risk factors or features
- 1-2 cm DTC: 24% chance recurrence, 49% increased mortality with lobectomy alone
- Individuals >45 - total thyroidectomy for tumors <1cm

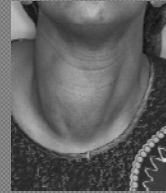


Cooper, et al 2009 Thyroid 19: 1167-1214.

Extent of Surgery

Total thyroidectomy

- High risk stratification with unknown or equivocal FNA
- Improved survival with increased extent of surgery
- All patients with >1cm thyroid cancer with no contraindication to surgery



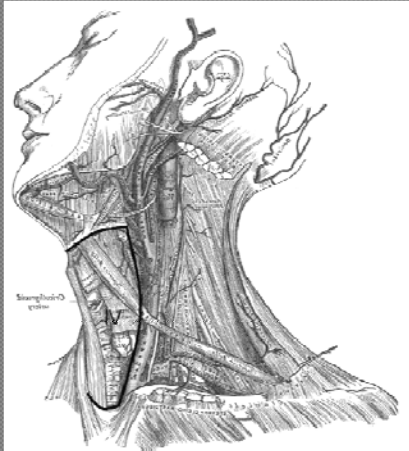
Cooper, et al 2009 Thyroid 19: 1167-1214.



Neck Dissection (central +/- lateral)

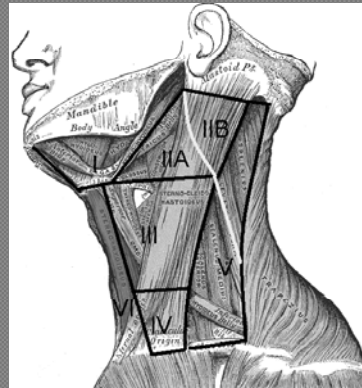


Neck dissection



Central

+/-

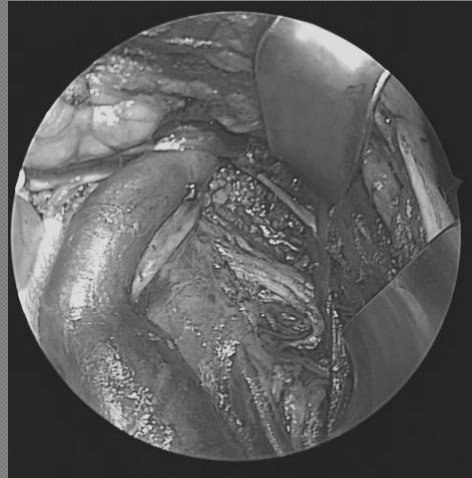


Lateral

Adopted from Gray's Anatomy, Wikipedia Commons



Post-ND Anatomy



Neck dissection

- General teaching: PTC lymph node metastases in low-risk patients not clinically significant
- 2 SEER studies recently demonstrated:
 - 1) lymph node metastases, age >45 years, distant mets, larger tumors predicted poor outcome
 - 2) lymph node mets independent for decreased survival only in follicular cancer and PTC in pts over age 45.
- Regional recurrence higher with nodal mets and ECS

Podnos et al 2005 Am Surg 71: 731-734
Cooper, et al 2009 Thyroid 19: 1167-1214.
Zaydfudium et al 2008 133: 1070-1077



Neck dissection

- Risks and benefits should be weighed with surgical expertise
- Level I and VII (below manubrium) may be involved
- En-bloc, functional neck dissections favored over isolated lymphadenectomy (“cherry-picking”) with some data to suggest improved mortality and reduced recurrence
- Most common site of recurrence is in cervical lymph nodes, which comprise the majority of all recurrences

Cooper, et al 2009 Thyroid 19: 1167-1214.

Neck dissection

- Central neck dissection (VI) and lateral neck for clinically involved nodes during total thyroidectomy: Rating B
- Consider prophylactic central neck dissection with clinically uninvolved central nodes: Rating C
- Total thyroidectomy without prophylactic central neck dissection for T1 or T2, node-negative PTCs, and most follicular cancers: Rating C

Cooper, et al 2009 Thyroid 19: 1167-1214.

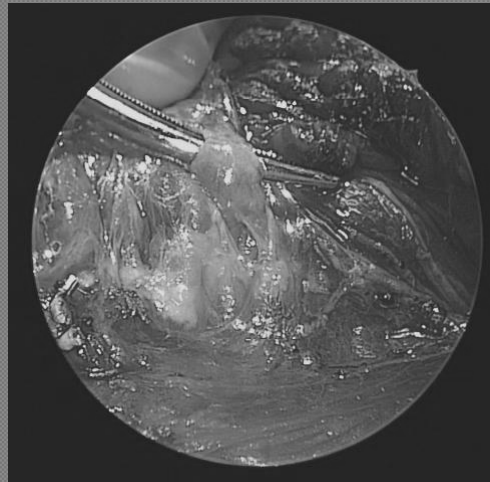


Minimizing Risks + Maximizing Outcome

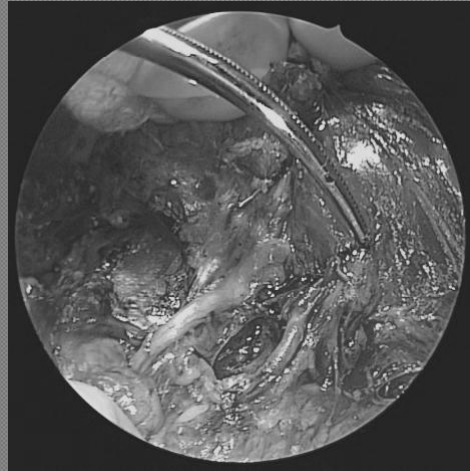
- Preoperative counseling and assessment critical
- Hypoparathyroidism – bilateral central neck dissections
- Debate: preoperative and post-operative vocal fold assessment
- Discussion of recurrent laryngeal nerve injury and sacrifice – higher incidence with thyroid cancers
- Chyle leaks, hematomas
- Accessory (CNXI) paresis



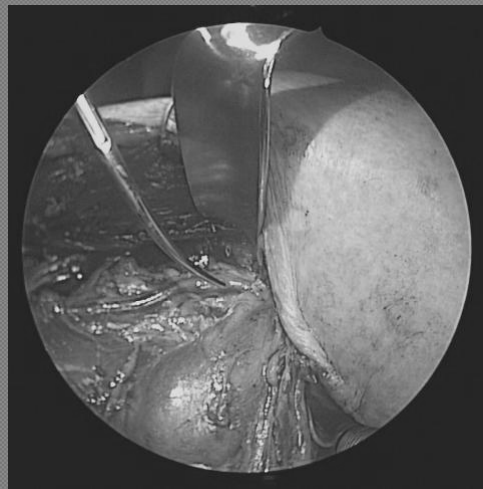
Parapreservation



Post-nerve Dissection Anatomy



Level IV; Thoracic duct



Case1 –Low risk

35 year old female
2 cm left nodule
No family history or risks
FNA – indeterminant
No vocal fold dysfunction
+/- Dysphagia
US – no lateral or central
adenopathy

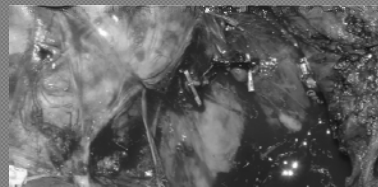


Case 1

Left thyroid lobectomy – frozen: follicular neoplasm

Nerve stuck to backside
of gland but dissected free

Patient did well without sequelae



Path: 2 cm angioinvasive
unencapsulated follicular thyroid carcinoma

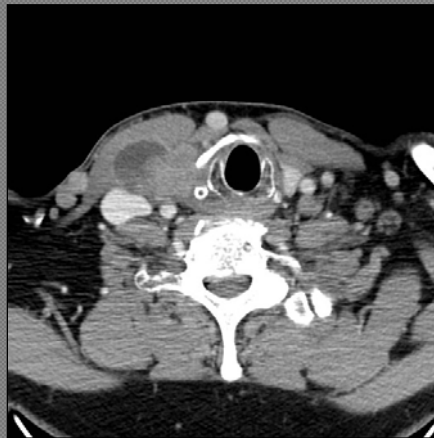
Patient underwent completion thyroidectomy and is
without evidence of disease

Case 2

60 year old male with hoarseness
Right neck and thyroid mass (5 cm)
Right vocal fold paralysis
No family history or risk factors
CT scan performed



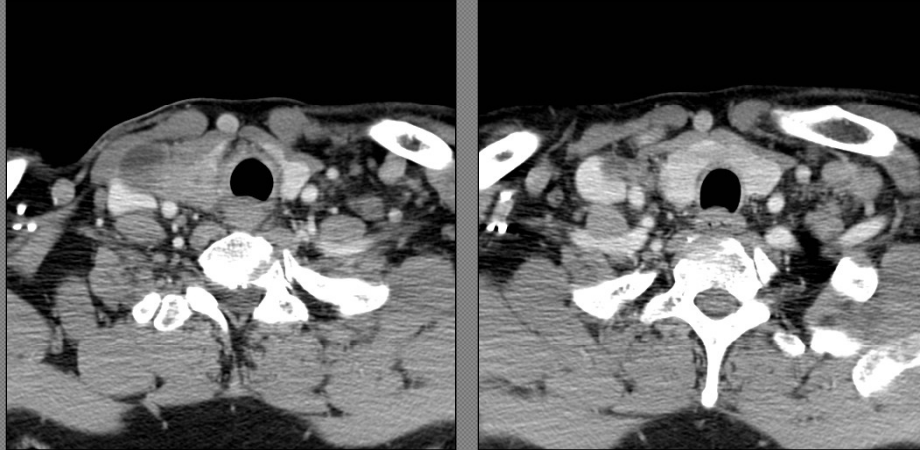
Case 2



FNA – papillary thyroid carcinoma



Case 2



Bilateral central and lateral disease; confirmed by US

Case 2

Total thyroidectomy, bilateral central and lateral neck dissections, sacrifice of right RLN and right IJ

Path: 5 cm PTC, capsular/perineural/lymphovascular/deep neck muscular invasion; 15/79 nodes positive with ECS

Case 2

**Required vocal fold medialization
recovered near-normal voice**

Post-operative RAI

No evidence of disease to date

**Baseline functional status – voice,
swallowing and function**

