



Surgical aspects of thyroid cancer treatment

October 2007

Michael W. Yeh, MD

Program Director, Endocrine Surgery

Assistant Professor

David Geffen School of Medicine at UCLA

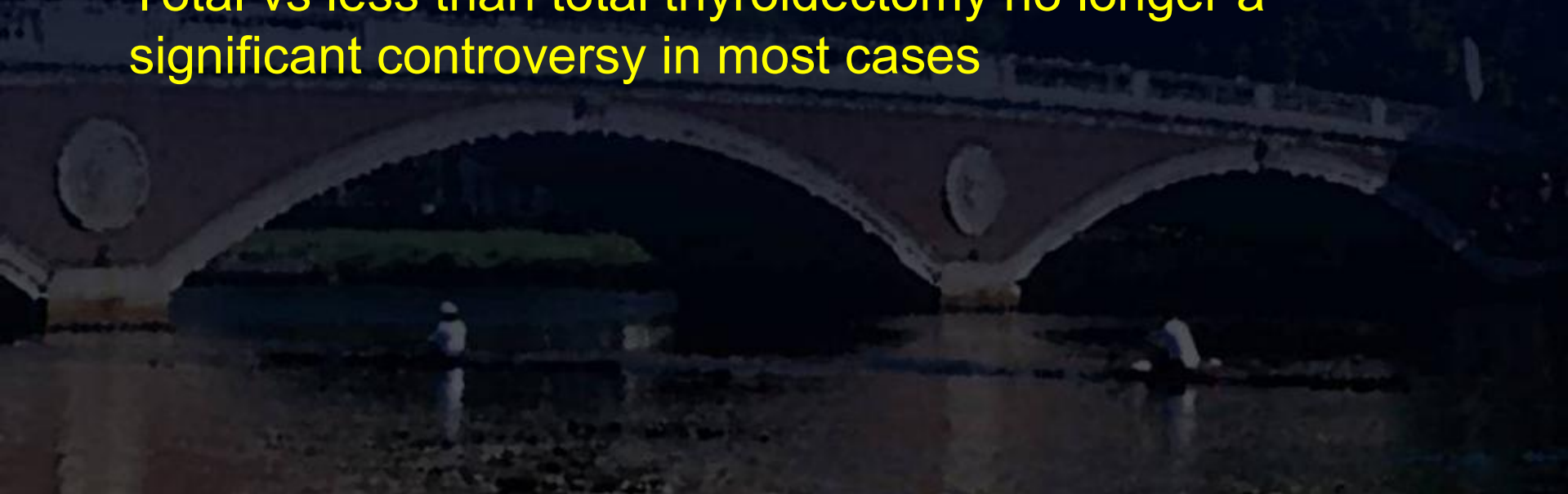
www.endocrinesurgery.ucla.edu

Learning objectives

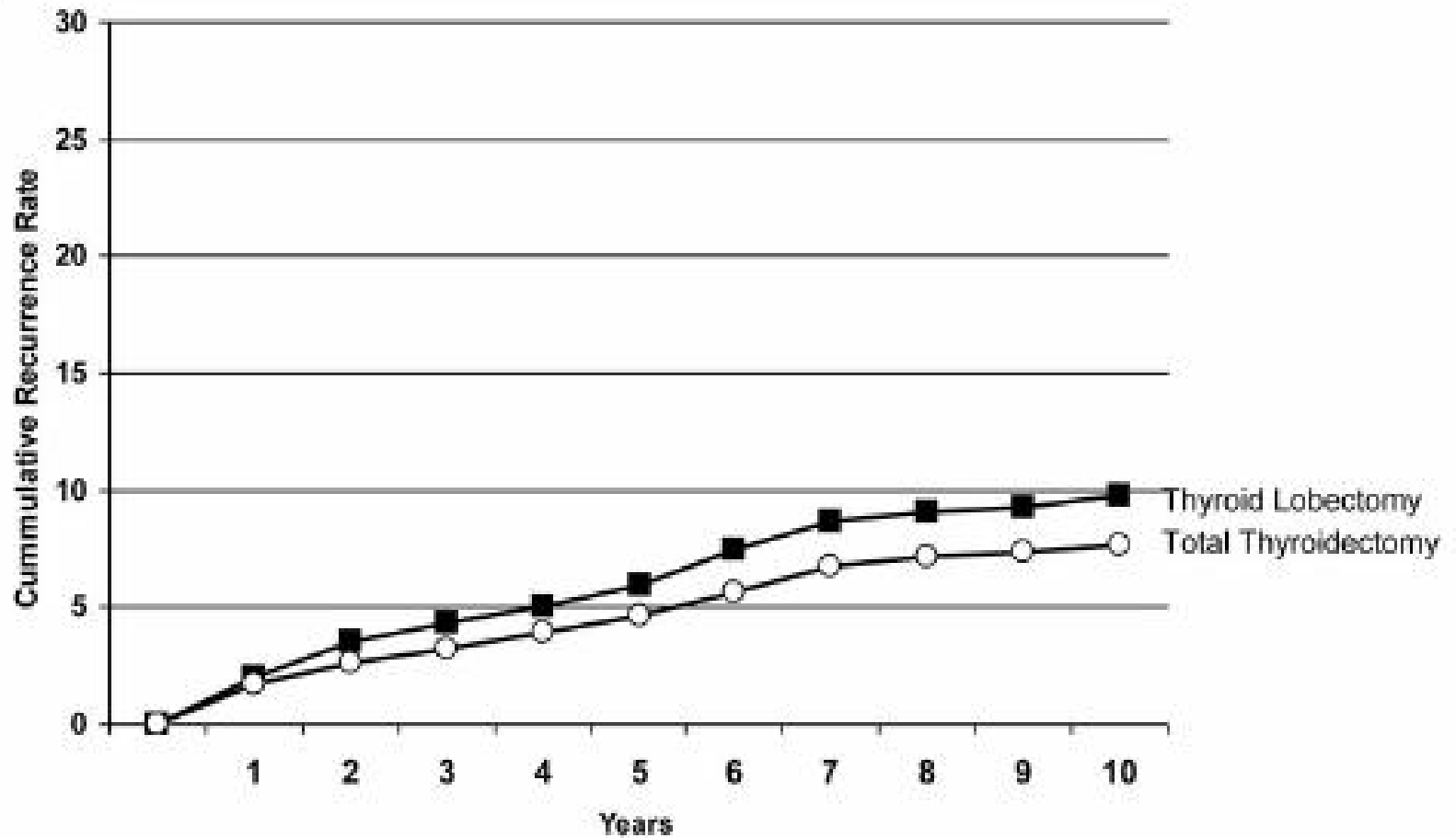
- Initial surgery for thyroid cancer
 - Technical aspects of thyroidectomy
 - Role of minimally invasive techniques
- Extent of initial surgery
 - Lymph node dissection
- Subsequent surgery for thyroid cancer
 - Recurrent disease
 - Persistent disease
- Tips on recovery from surgery

Initial surgery for thyroid cancer

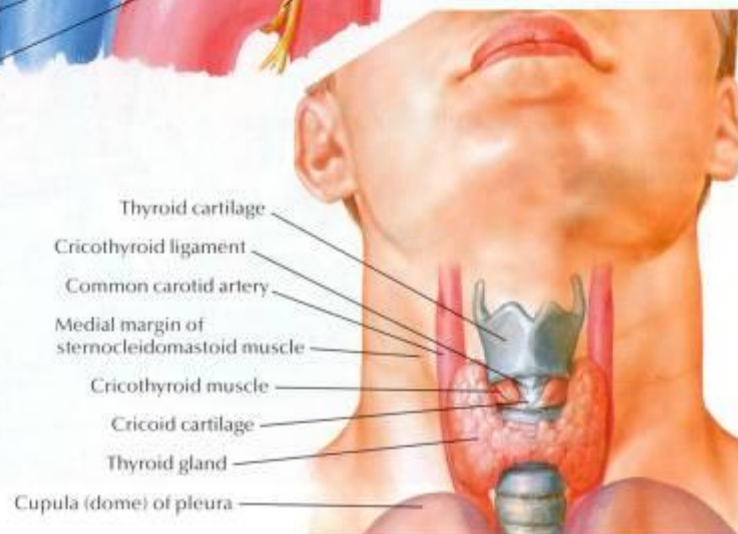
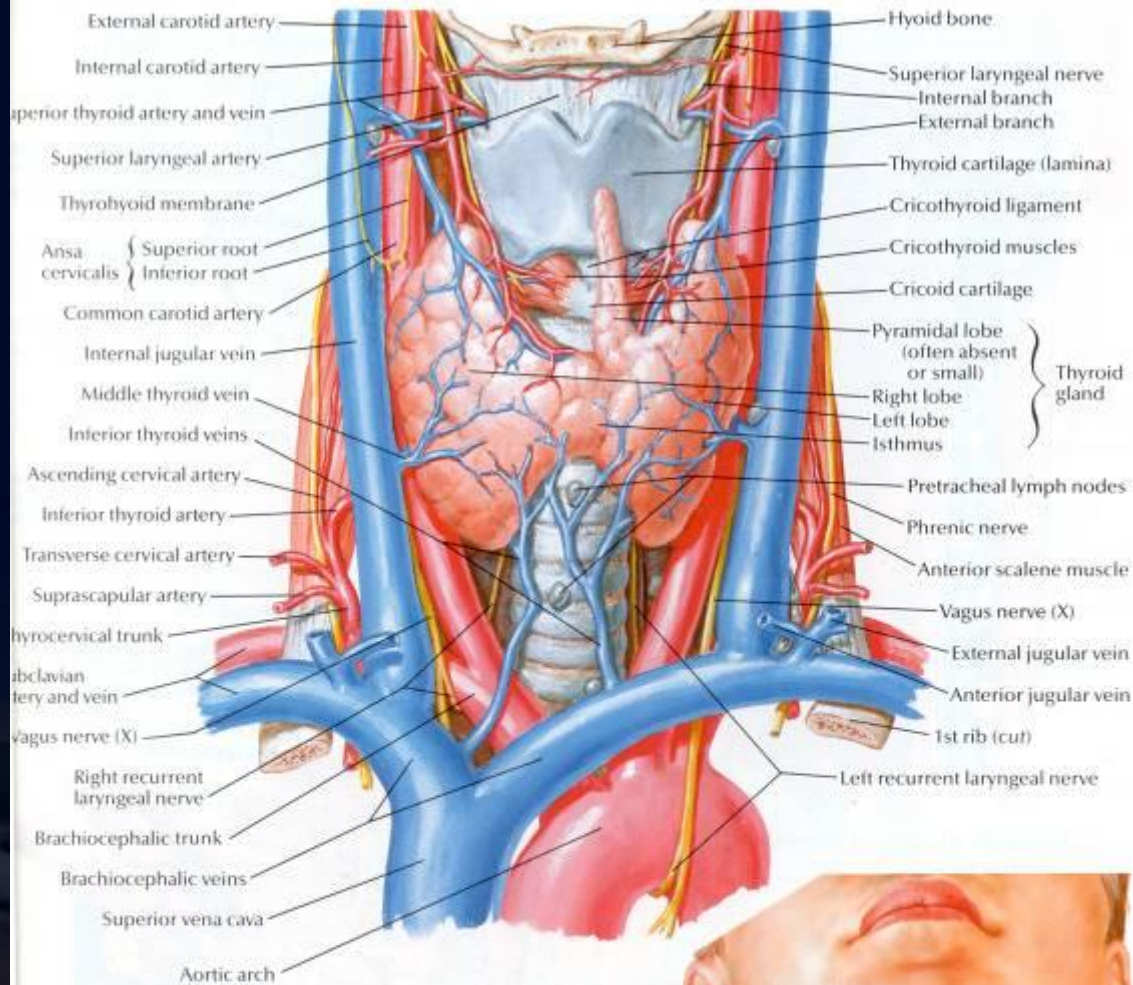
- Advantages of total thyroidectomy
 - Allows radioiodine ablation of any remaining (microscopic) normal or neoplastic thyroid tissue
 - Enables following of thyroglobulin (Tg) as a tumor marker
 - Deals with problem of tumor multifocality
- Total vs less than total thyroidectomy no longer a significant controversy in most cases



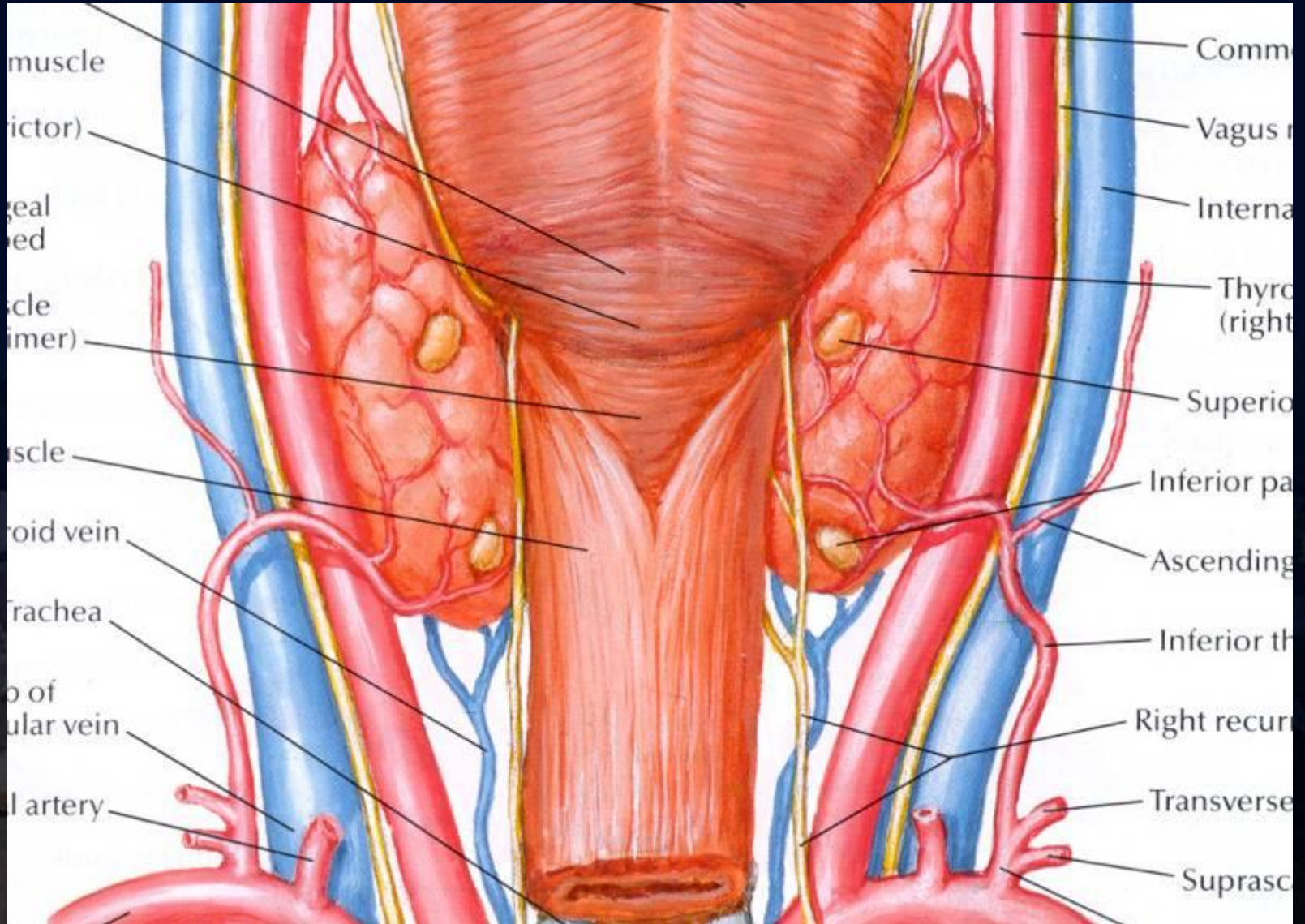
B.



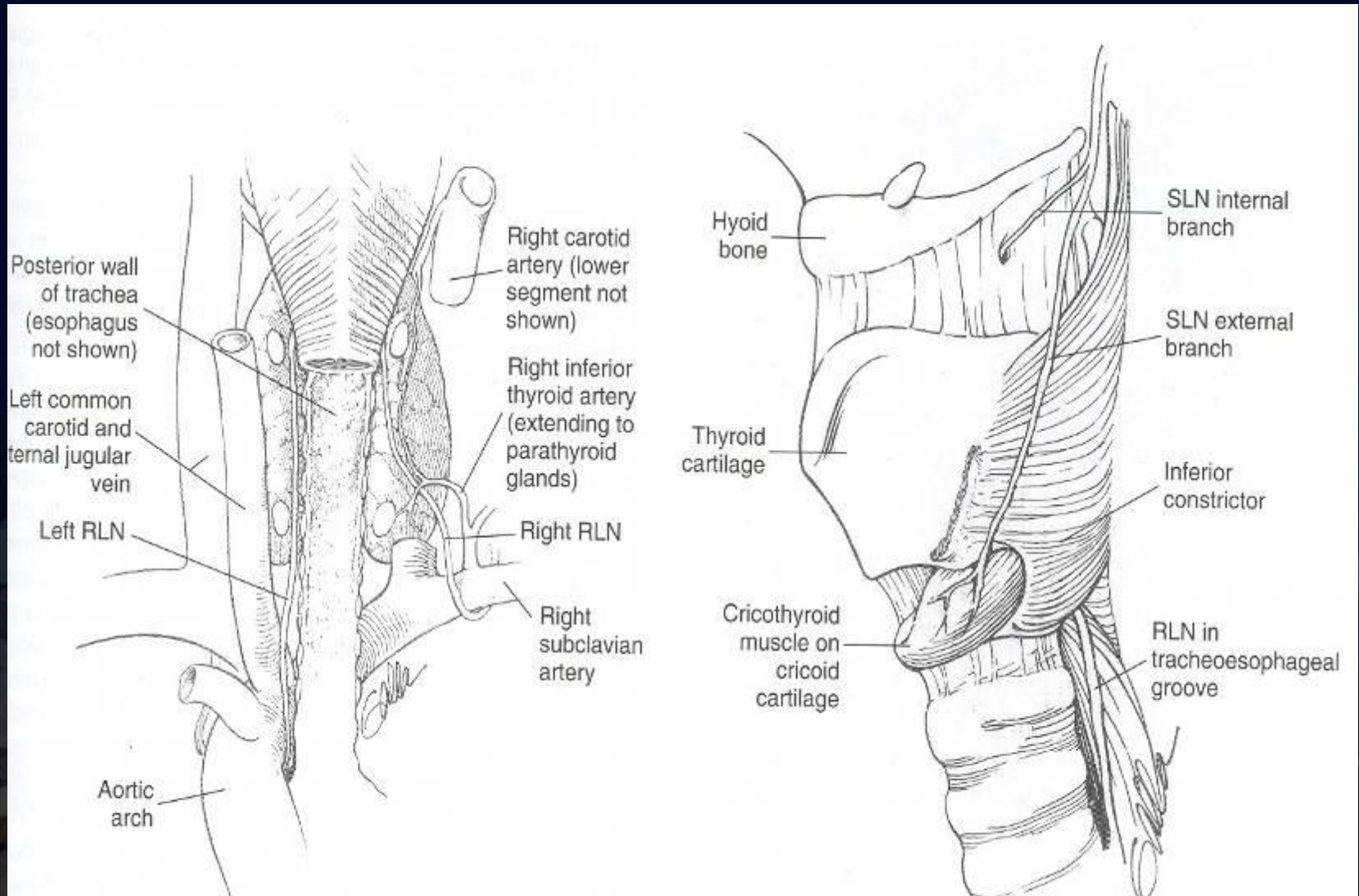
Bilimoria KY, Extent of surgery affects survival for papillary thyroid cancer, Ann Surg 2007



Thyroid: Posterior view

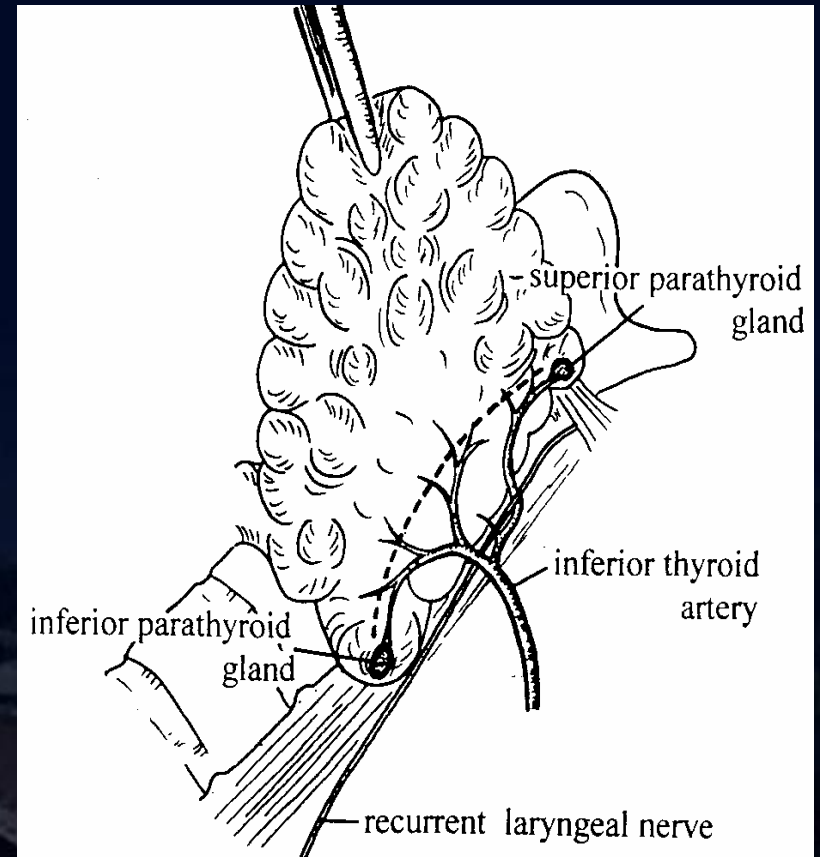
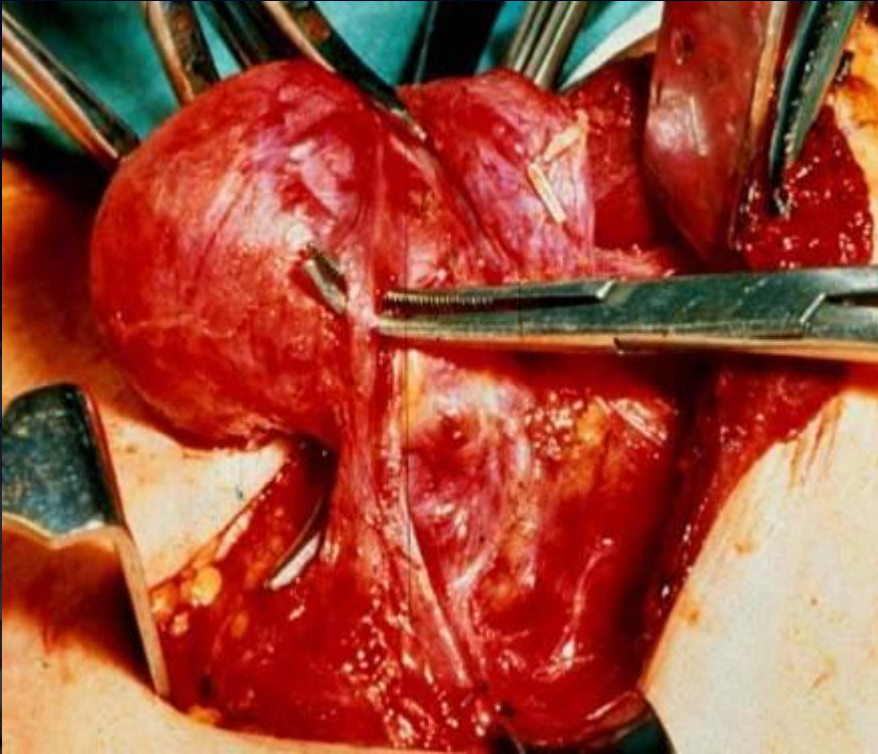


Anatomy of nerves

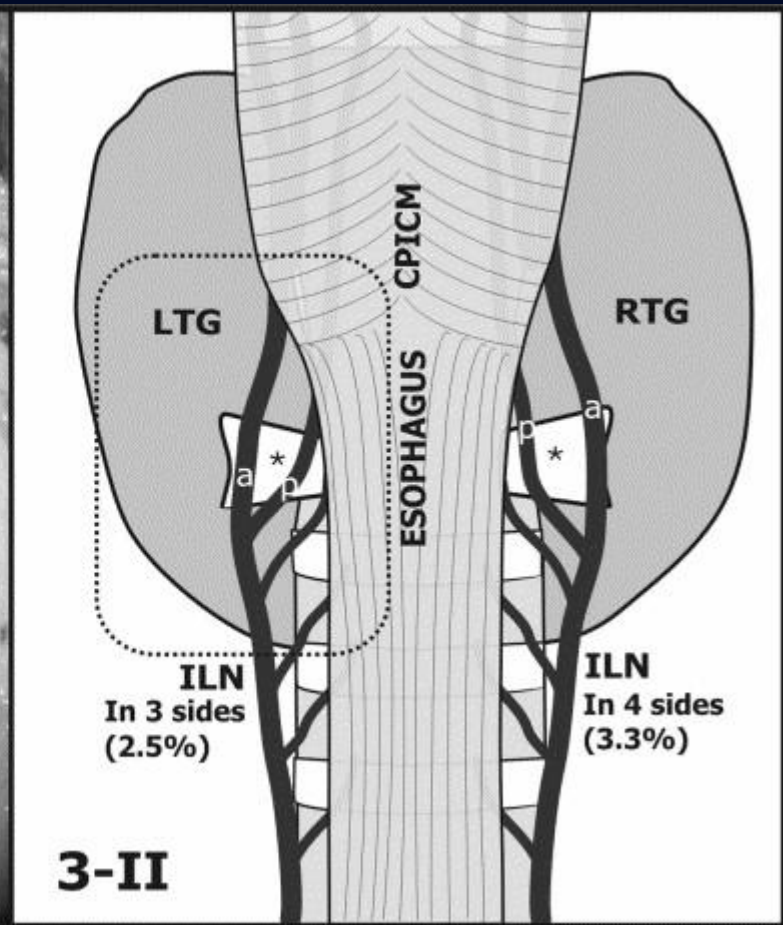
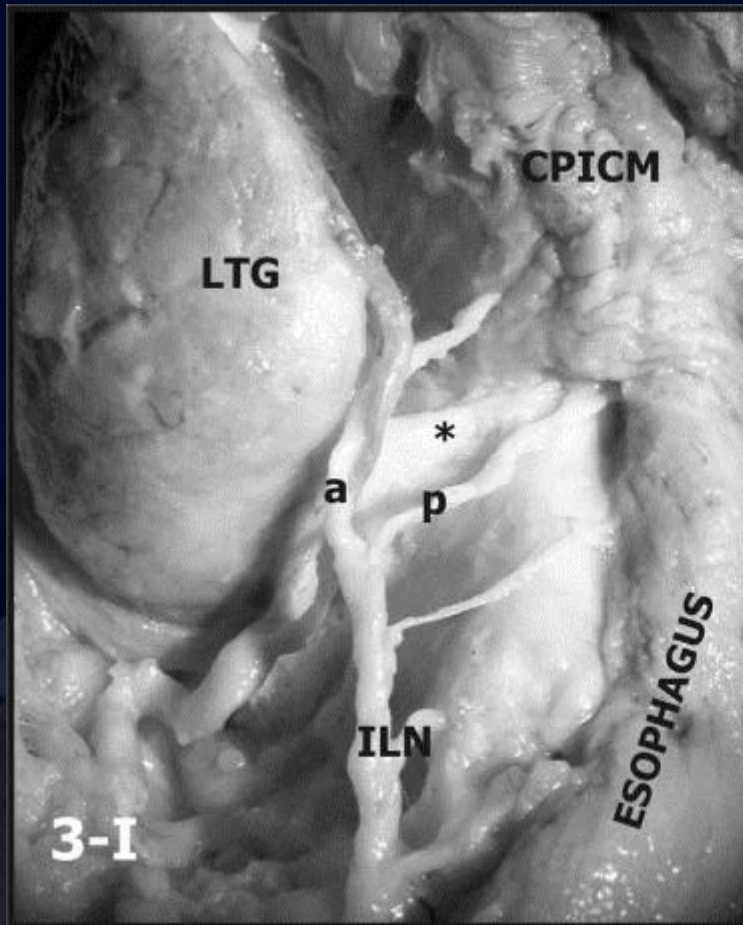


Technique of capsular dissection

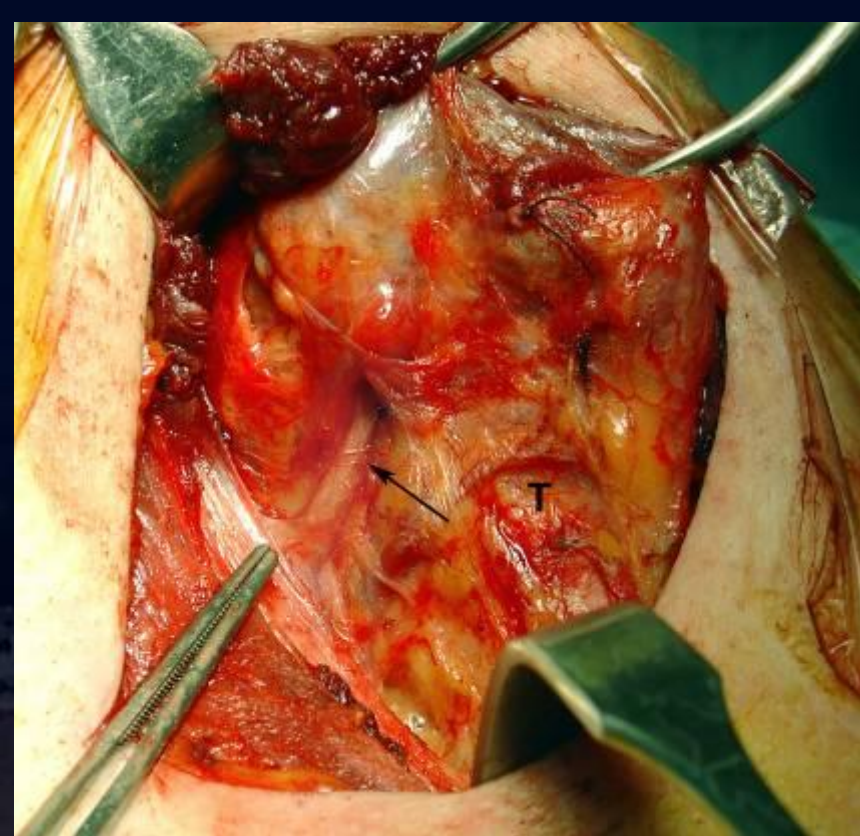
Ligation of tertiary branches of vessels on capsule

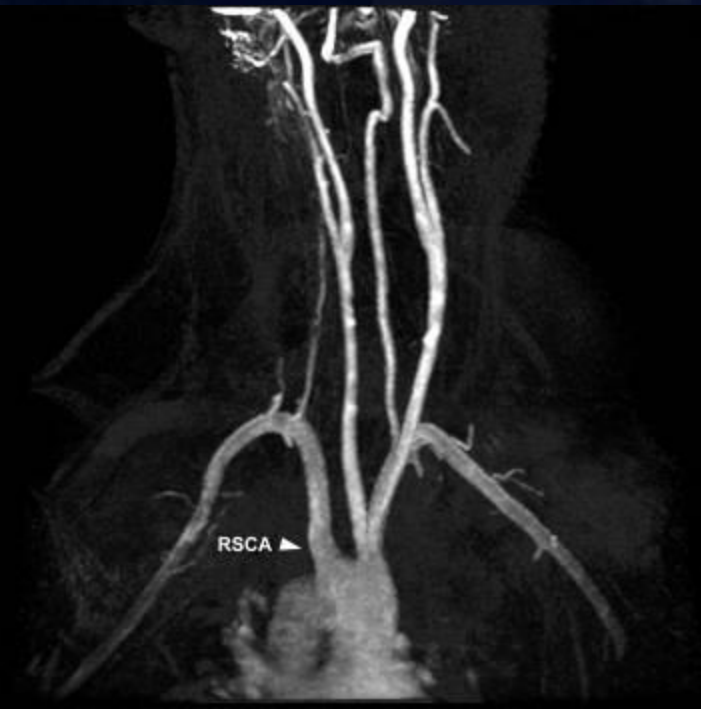
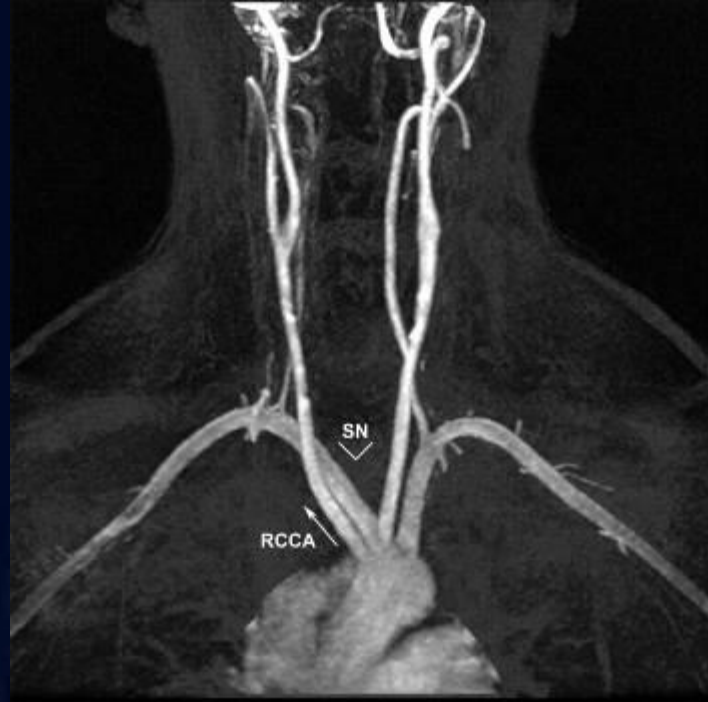


RLN: Branches



RLN: Anatomic variants





External laryngeal nerve

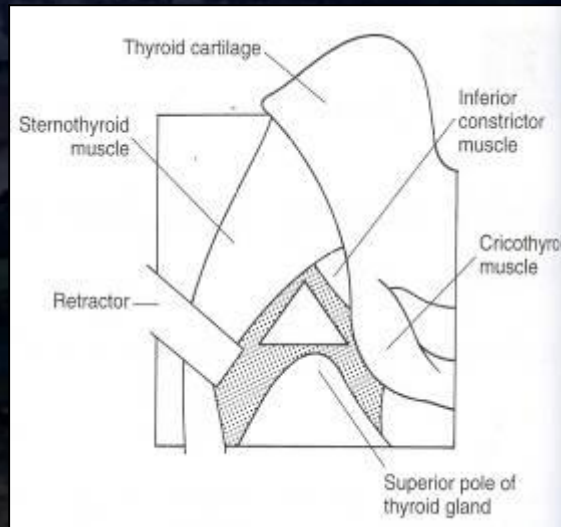
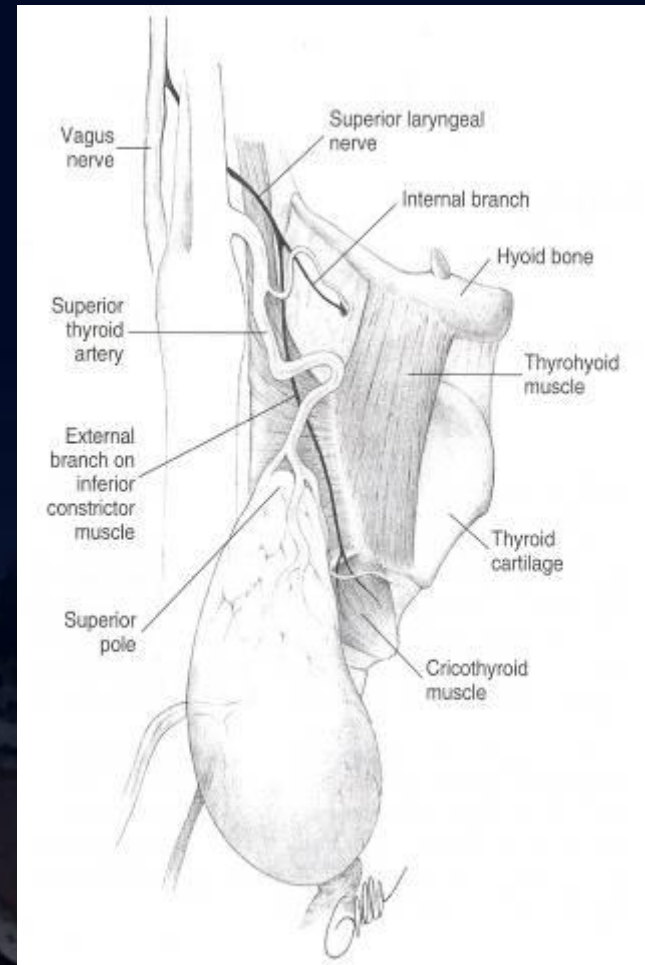
- 1970 – avoidance: the “neglected” nerve
general awareness of the nerve with attempts to avoid it but not routinely identified (seen in 22% of cases)
- 1990 - identification rate improved to 52%
- Now – routine identification

Hisham et al demonstrated that the nerve could be identified in 95% of cases and that is now the benchmark

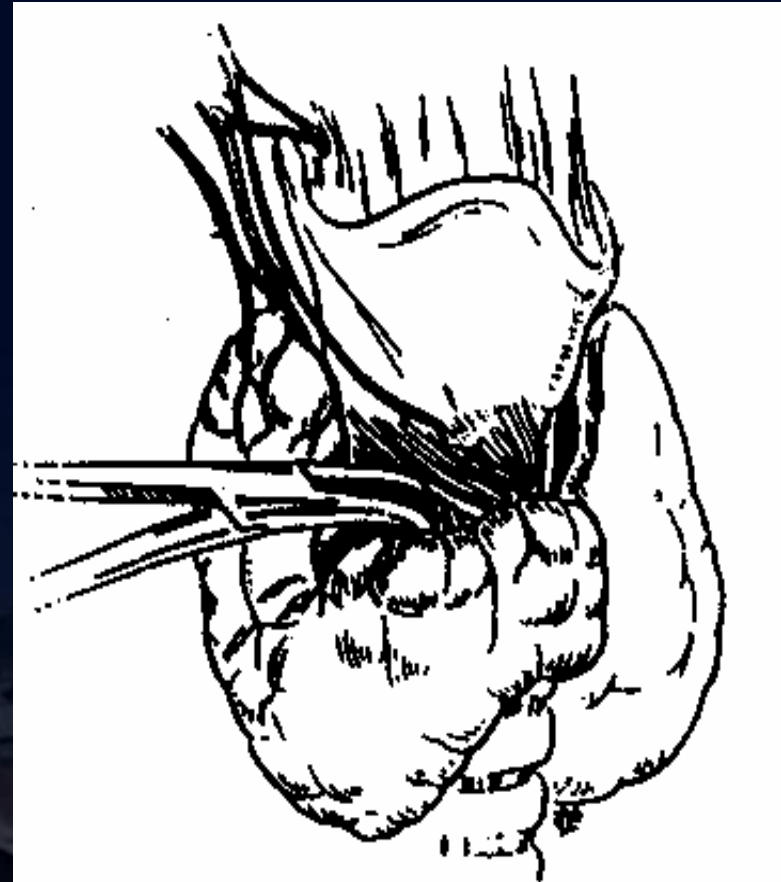
Aina EN, Hisham AN. External laryngeal nerve in thyroid surgery: recognition and surgical implications. ANZ J Surg. 2001 Apr;71(4):212-4.

Anatomy: External branch superior laryngeal nerve

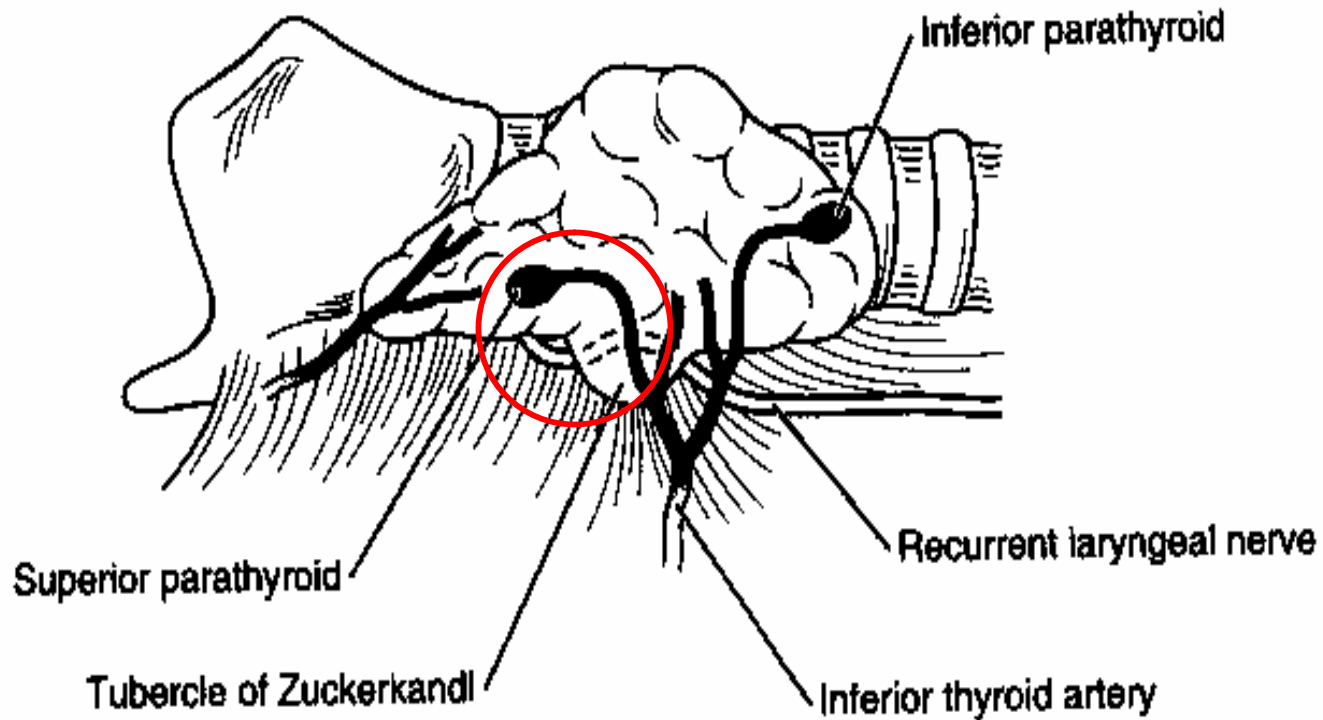
- Enters the sternothyroid-laryngeal triangle
 - medially – inferior constrictor and cricothyroid
 - anteriorly the sternothyroid
 - laterally – superior pole of thyroid
- enters surface of cricothyroid muscle



Opening of avascular space

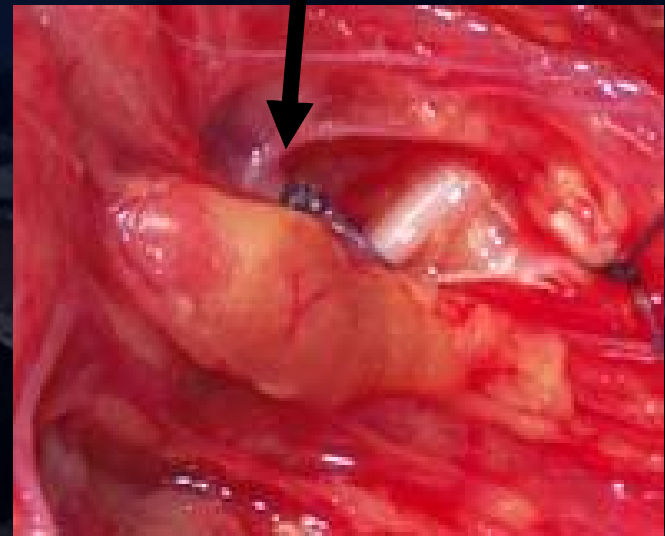
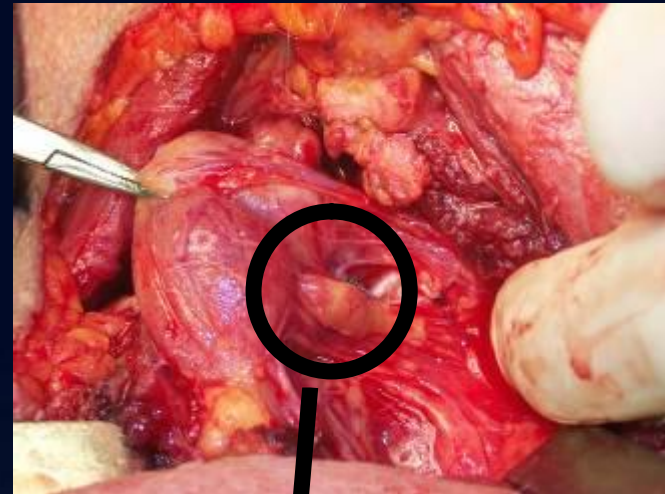
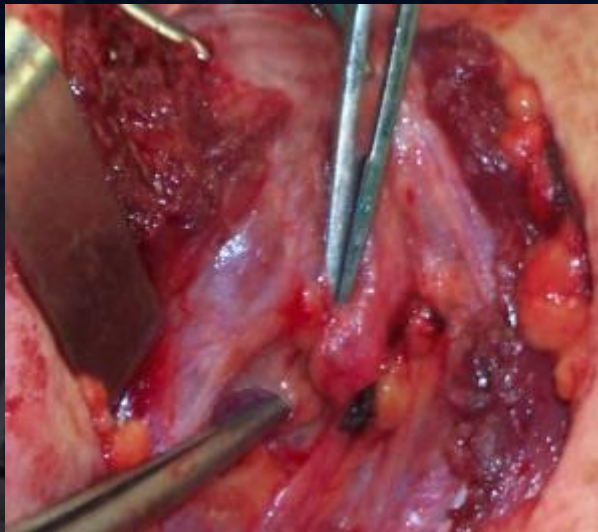


“Hot zone” in thyroid surgery



Relationship to superior parathyroid gland

The Tubercle of Zuckerkandl maintains a very constant relationship to the superior parathyroid gland with which it shares a common embryological origin

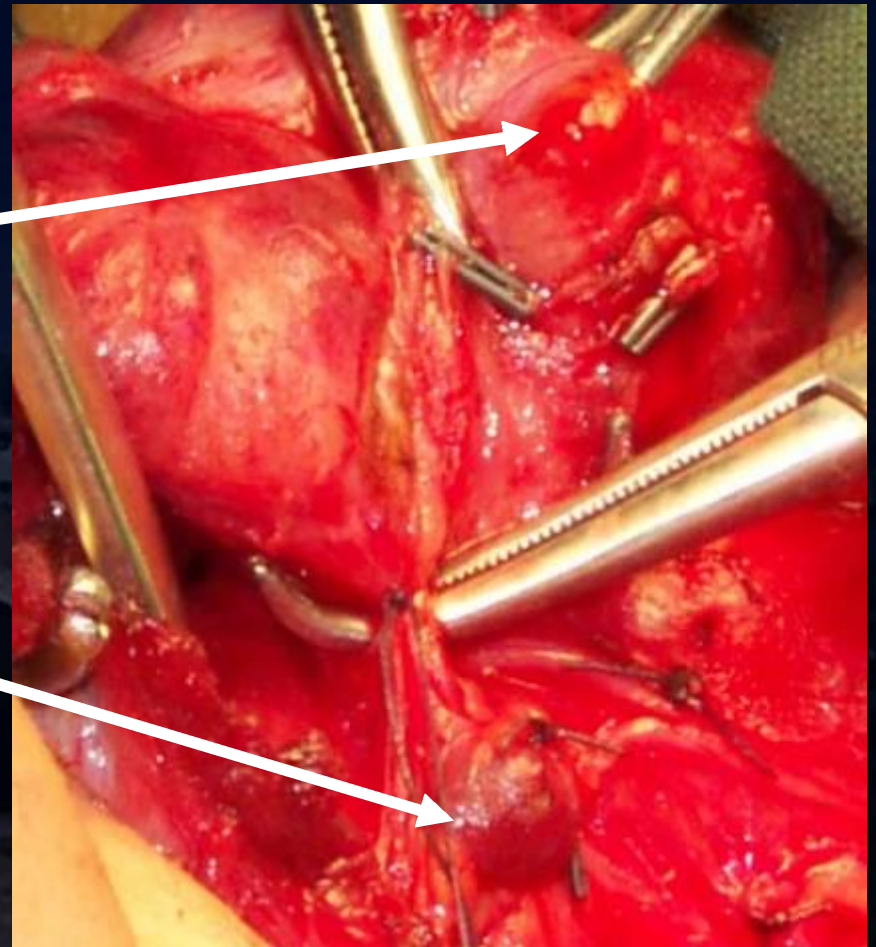


Parathyroid autotransplantation

Highly successful graft take
Ready autotransplantation of
nonviable or questionable
glands – assessment of
perfusion

Parathyroid high on
surface of thyroid

Pedicle ligated



Injection technique of parathyroid autotransplantation



Minimally invasive thyroid surgery

- Minimally invasive video-assisted thyroidectomy, Miccoli, University of Pisa
- 1.5-2.5 cm incision, compared to 3.5-4 cm open
- Applicable to selected patients – small nodule (<3.5 cm), small total thyroid volume (<15 mL by ultrasound), absence of thyroiditis (serology)
- Single study in PTC (33 pts)
- Demonstrates equivalency

Miccoli P, Minimally invasive video-assisted thyroidectomy for papillary carcinoma: A prospective study of its completeness, Surgery 2002



Scar appearance 3 months after open surgery for thyroid cancer



Initial management of lymph nodes in PTC

“The message is that there are known knowns - there are things that we know that we know.

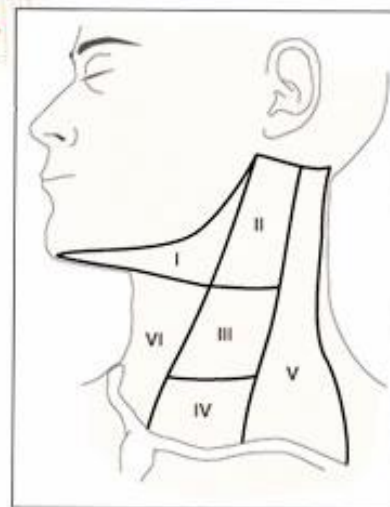
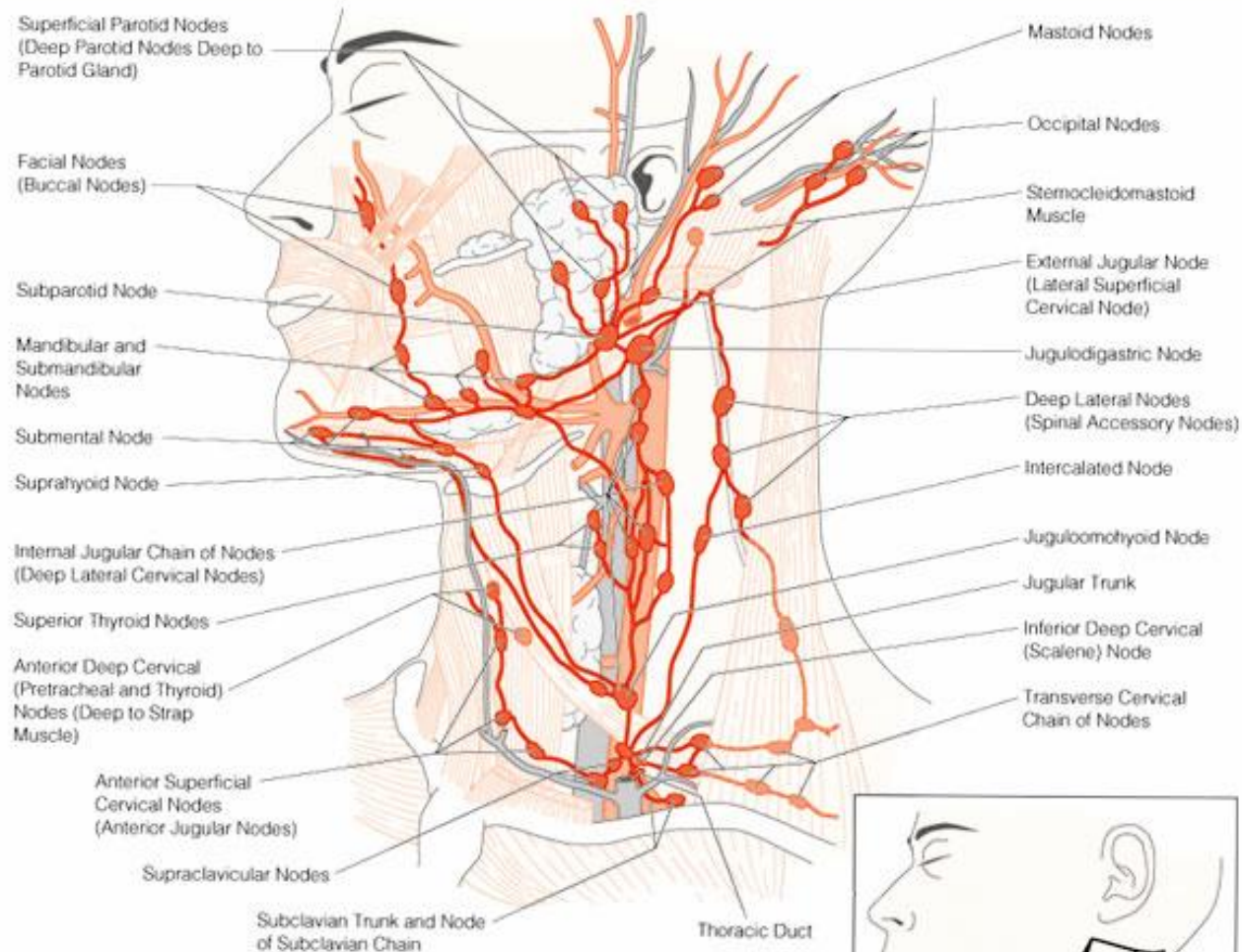
There are known unknowns - that is to say, there are things that we now know we don't know.



But there are also unknown unknowns – there are things we do not know we don't know.

And each year we discover a few more of those unknown unknowns.”

Department of Defense news briefing 12/2/2002



Initial management of lymph nodes

- Palpable and sonographically detectable abnormal lymph nodes should be removed at initial surgery
- Is there a role for “prophylactic” lymph node dissection?
- The Japanese literature on this topic

Table 3.

Relationship between tumor size and central lymph node metastasis

Tumor size	Node metastasis (%)		Total
	Absent	Present	
≤ 1 cm*	82 (61.7)	51 (38.3)	133
1.1–2 cm	109 (40.8)	158 (59.2)	267
2.1–4 cm	73 (16.3)	205 (73.7)	278
> 4 cm	17 (21.0)	64 (79.0)	81
Total	281 (37.0)	478 (63.0)	759

* $P < 0.0001$.

Table 6.

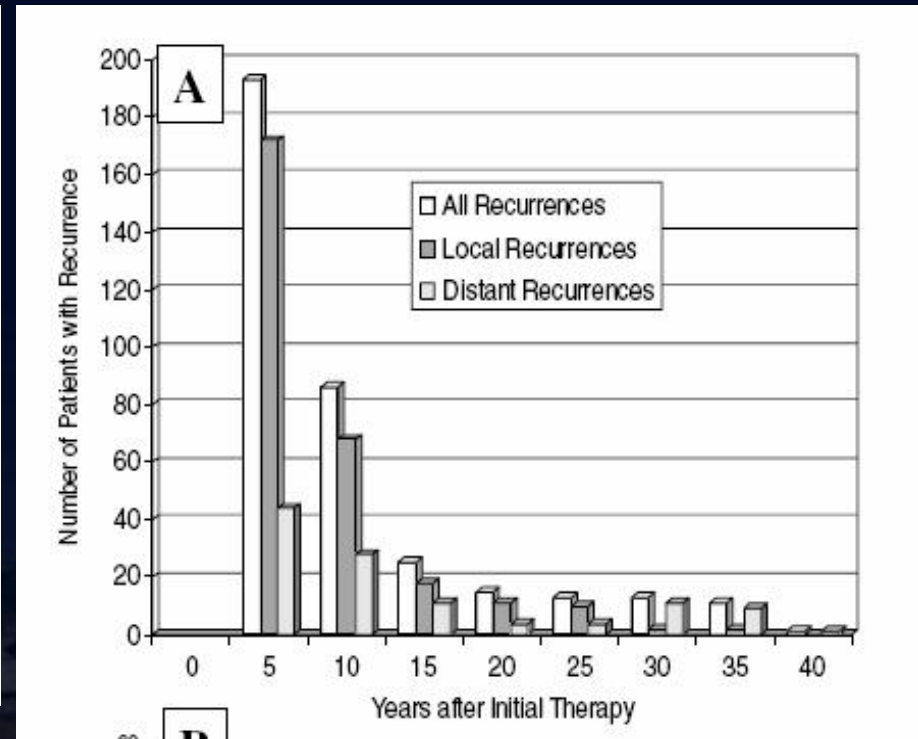
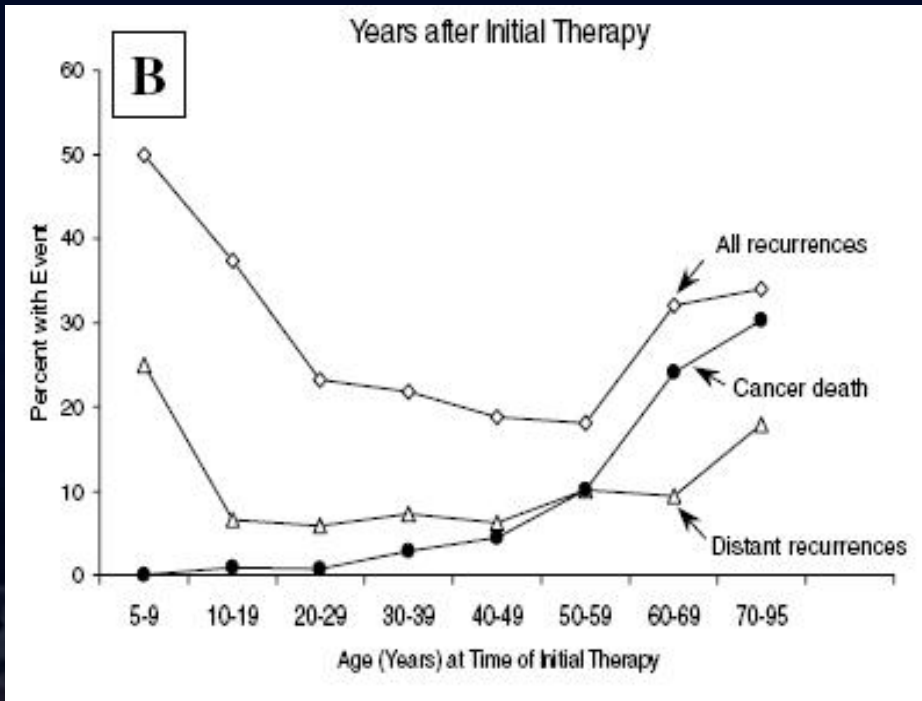
Relationship between tumor size and lateral lymph node metastasis

Tumor size	Node metastasis (%)		Total
	Absent	Present	
≤ 1 cm*	51 (55.4)	41 (44.6)	92
1.1–2 cm	115 (46.6)	132 (53.4)	247
2.1–4 cm	81 (29.6)	193 (70.4)	274
> 4 cm	17 (21.0)	64 (79.0)	81
Total	264 (38.0)	430 (62.0)	694

* $P < 0.0001$.

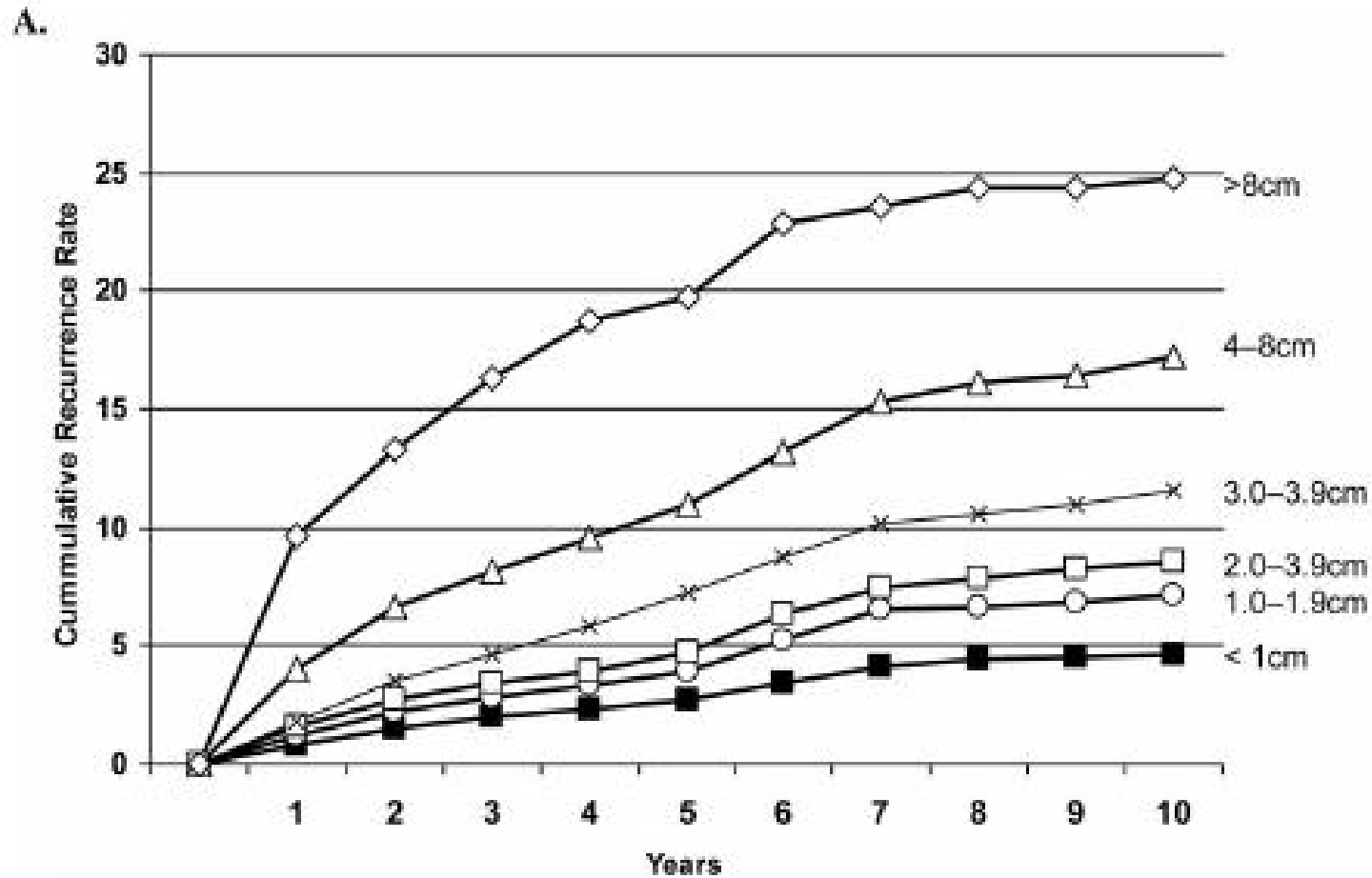
Ito Y, Clinical significance of lymph node metastasis of thyroid papillary carcinoma located in one lobe, World J Surg, 2006

Thyroid cancer recurrence



Mazzaferri EL & Kloos RT 2002 Is diagnostic iodine-131 scanning with recombinant human TSH (rhTSH) useful in the follow-up of differentiated thyroid cancer after thyroid ablation? *Journal of Clinical Endocrinology and Metabolism* 87 1490–1498.

PTC recurrence rates by tumor size



Bilimoria KY, Extent of surgery affects survival for papillary thyroid cancer, Ann Surg 2007

Prophylactic central (level 6) neck dissection

- May improve survival (1.6% vs 8.4-11.1% DSM)
- May reduce disease recurrence rates
- Probably reduces post-operative thyroglobulin levels
- May come with a small price: complications
 - Permanent recurrent laryngeal nerve injury
 - Permanent hypoparathyroidism
- Is probably better than having to go back for a second operation in the central neck
- Ipsilateral central neck dissection is probably a good balance of risk and benefit

White ML, Central lymph node dissection in differentiated thyroid cancer, World J Surg 2007

R27. Routine central-compartment (level VI) neck dissection should be considered for patients with papillary thyroid carcinoma and suspected Hürthle carcinoma. Near-total or total thyroidectomy without central node dissection may be appropriate for follicular cancer, and when followed by radioactive iodine therapy, may provide an alternative approach for papillary and Hürthle cell cancers—Recommendation B

2006 ATA guidelines

What can we conclude?

- Microscopic lymph node metastasis of PTC are the rule
- Only a small fraction (1/4-1/3) of these go on to become clinically significant
- Most micrometastases remain quiescent!
- Survival benefit from prophylactic LND is unlikely in low-risk PTC
- Possible benefit with respect to locoregional recurrence and thyroglobulin levels
- “No one ever died of thyroglobulinemia.”
- The central compartment is difficult to survey
- Prophylactic ipsilateral (level 6) LND likely has a role in the lifetime strategic management of PTC



Subsequent surgery for thyroid cancer

- Central neck dissection (lymph node recurrence)
- Modified radical neck dissection (lymph node recurrence)
- Radical re-excision central neck tumor (local recurrence)

- Thyroglobulin (+/- rhTSH) and neck ultrasound
- Small elevations in Tg usually indicate locoregional recurrence
- Larger elevations suggest distant disease

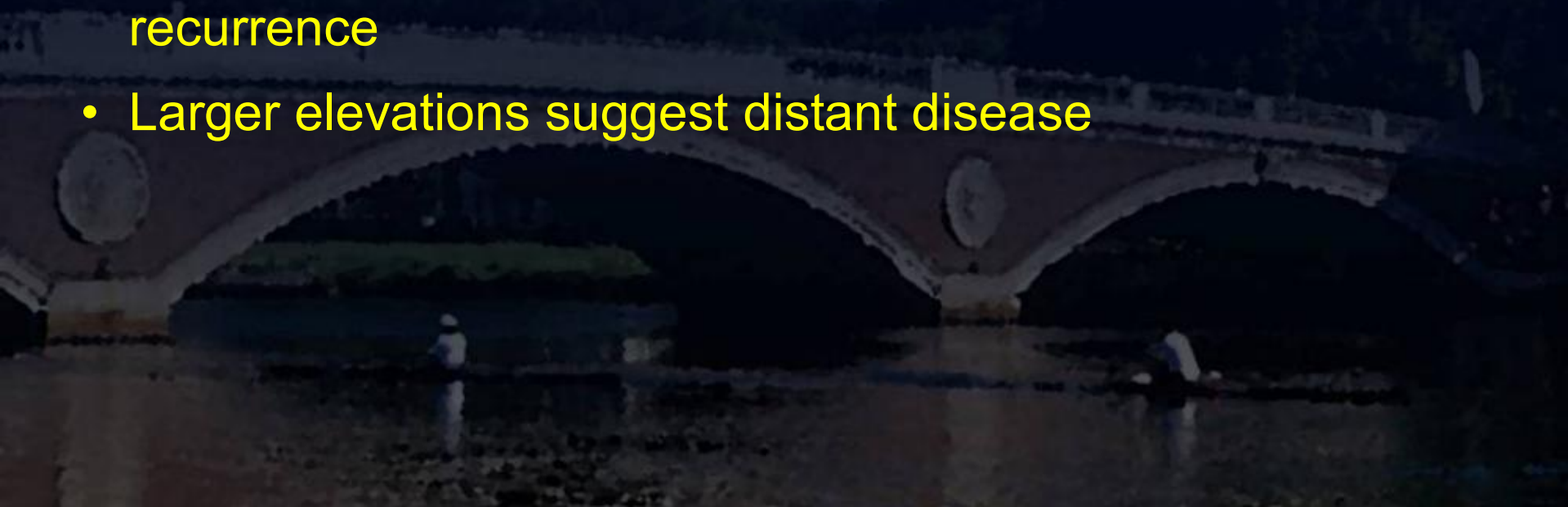


TABLE 2. Serum Tg and sites of metastases

	All bone	Pure bone	All lung	Pure lung	All mediastinum	Pure mediastinum	All cervical	Pure cervical
n	38	7	91	15	74	5	104	31
Age (yr)								
Mean	57.4	57.6	53.7	42.7	51.7	41.2	49.8	40.6
SD	11.2	4.8	17.7	19.1	19.4	19.7	17.8	11.5
Prestimulated Tg (ng/ml)								
Median	687	48	34	8	25	4	10	2
Minimum	5	8	0	0	0	0	0	0
Maximum	65,400	1,000	65,400	1,160	62,000	16	65,400	120
Poststimulated Tg (ng/ml)								
Median	2,030	416	246	72	180	16	43	8
Minimum	12	12	0	6	0	1	0	0
Maximum	97,400	3,000	88,000	2,060	97,400	82	97,400	1,760
Fold increase								
Median	2.5	2.4	3.3	5.0	3.2	2.5	3.3	3.3
Minimum	0.9	1.5	0.8	1.0	1.0	1.7	0.3	0.3
Maximum	19.2	8.7	34.0	17.0	41.0	41.0	34.0	14.7
Increment								
Median	1,032	368	130	42	80	12	17	4
Minimum	-9,720	4	-9,720	4	-600	0.4	-9,720	-1.4
Maximum	42,400	2,000	26,000	1,940	42,400	80	42,400	1,640

Robbins RJ, Factors influencing the basal and recombinant human thyrotropin-stimulated serum thyroglobulin in patients with metastatic thyroid carcinoma, J Clin Endo Metab 2004

Table IV. Preventability of reoperation in 72 patients with persistent or recurrent PTC

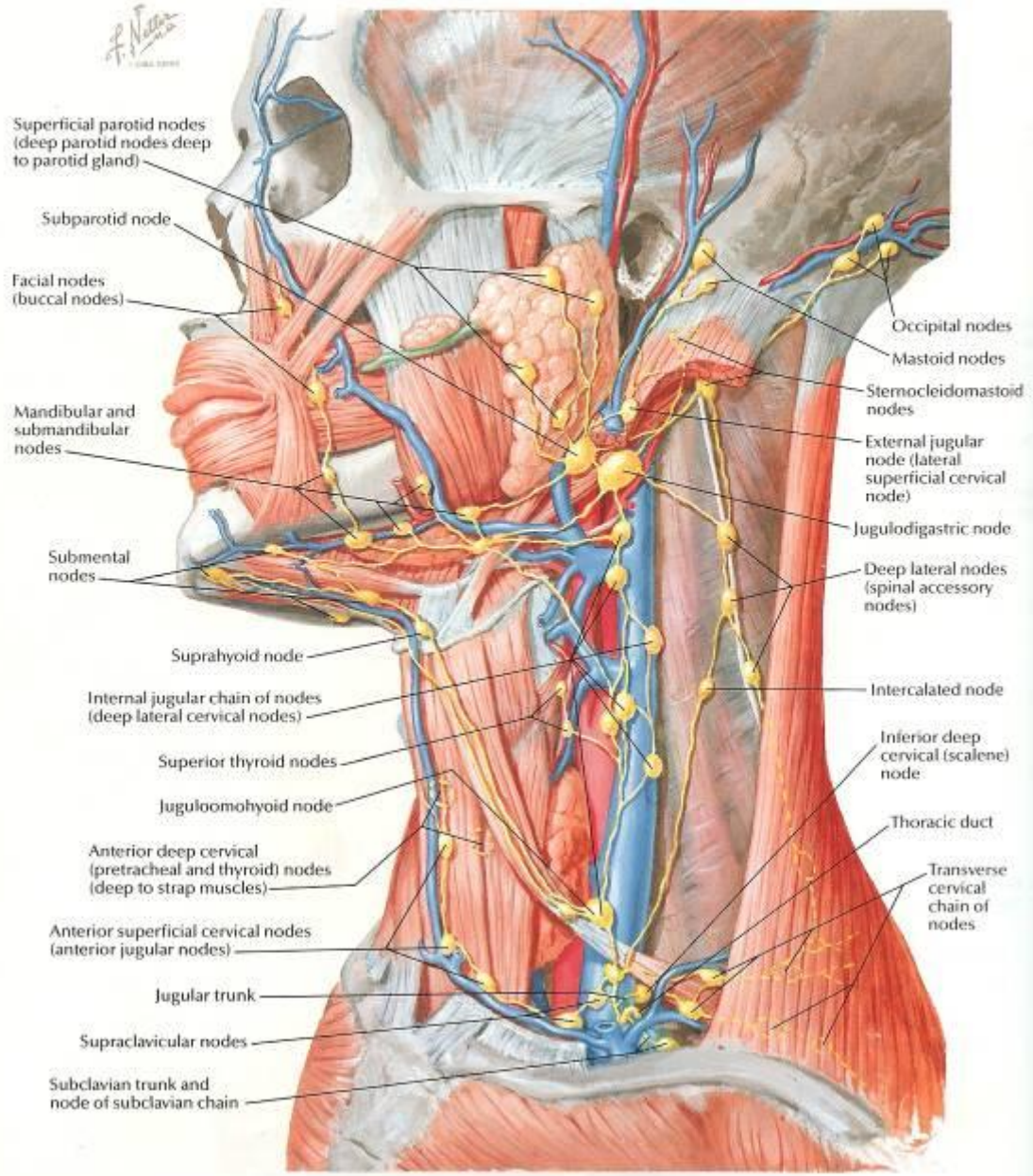
	<i>No. of Patients</i>
I. Group 1 (persistent PTC)	17
A. Reoperation preventable	14 (82%)
1. Inadequate preoperative imaging*	12 (71%)
a. Ultrasonography not performed before surgery	4
b. Ultrasonography of thyroid performed without assessment of levels II to V	8
2. Incomplete initial surgery	11 (65%)
a. Known lateral neck disease not dissected	3
b. Node plucking (from lateral neck) at initial surgery with persistent disease in the same compartment	2
c. Incomplete resection of the primary thyroid neoplasm	2
d. Bulky central compartment disease not completely resected	4
B. NCCN guidelines not followed	11 (65%)
1. Less than total or less than near-total thyroidectomy performed	8
2. Gross lymph node metastases but neck dissection not performed	6†
II. Group 2 (recurrent PTC)	55
A. Reoperation preventable	27 (49%)
1. Incomplete initial operation	14 (25%)
a. Node plucking at initial surgery with recurrence in the same compartment	9
b. Gross lymph node metastases not removed	5
2. Inadequate TSH suppression (>0.5 μU/mL)	17 (31%)
B. NCCN guidelines not followed	22 (40%)
1. Less than total or near-total thyroidectomy performed	4
2. Completion total thyroidectomy not performed	1‡
3. Gross lymph node metastases but neck dissection not performed	17

- Up to 39% of re-operations for thyroid cancer are a direct result of incomplete initial surgery
- Ultrasound is an essential tool in the treatment of thyroid cancer
- Compartment-oriented lymph node dissection
- Re-operations carry increased surgical risk

Kouvaraki, Preventable reoperations for persistent and recurrent papillary thyroid carcinoma, Surgery 2004

Lymph Vessels and Nodes of Oral and Pharyngeal Regions

SEE ALSO PLATE 197



Cricoid

This is an intraoperative photograph of the neck. The surgical field is open, revealing the cricoid cartilage at the top. Below it, the esophagus is visible on the left side. The carotid artery and jugular vein are also visible on the left. The right laryngeal nerve (RLN) is seen in the center, and the left lobe of the thyroid gland is on the right. A metal surgical retractor is used to hold the incision open.

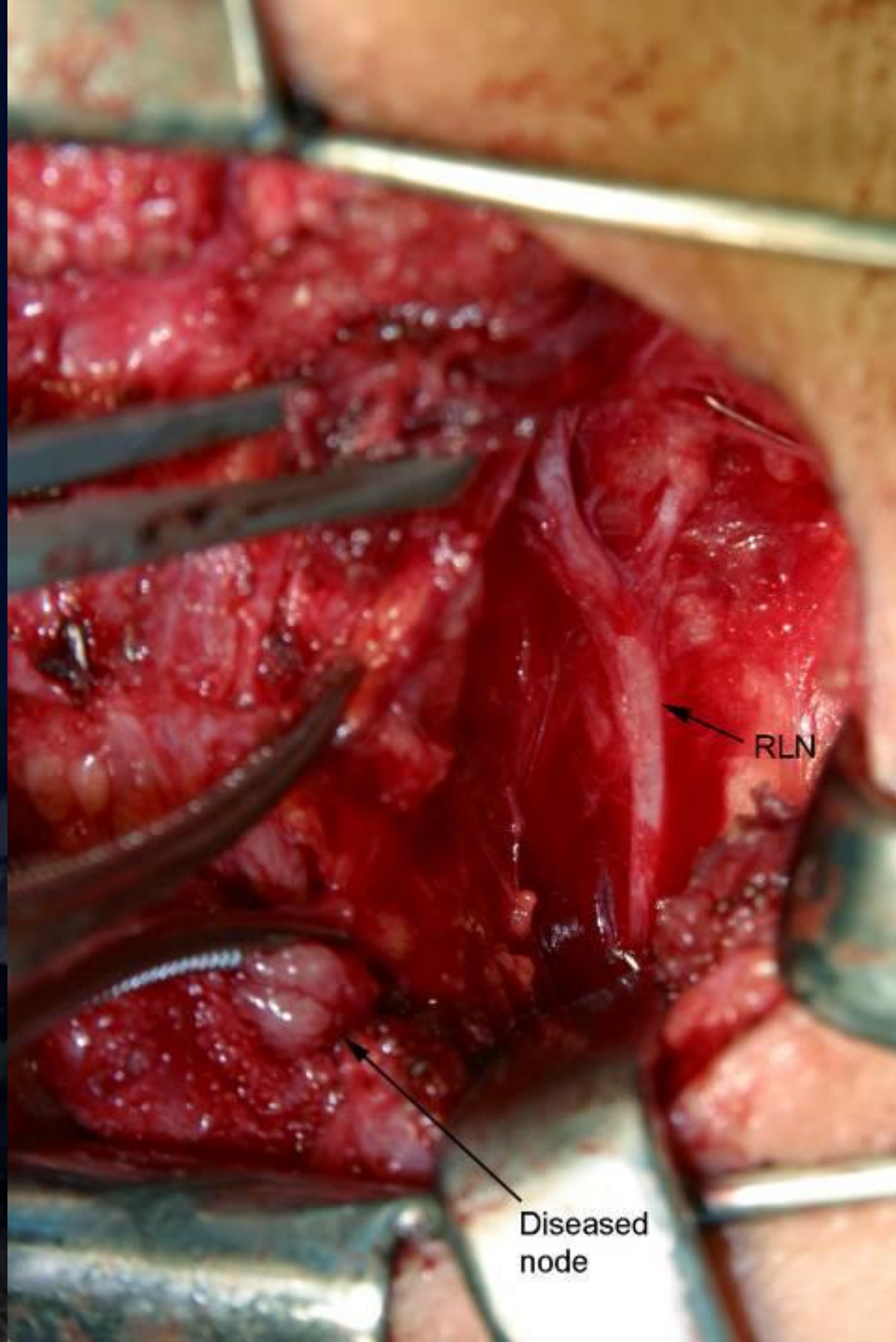
Esophagus

Lt Lobe Thyroid

Carotid Artery

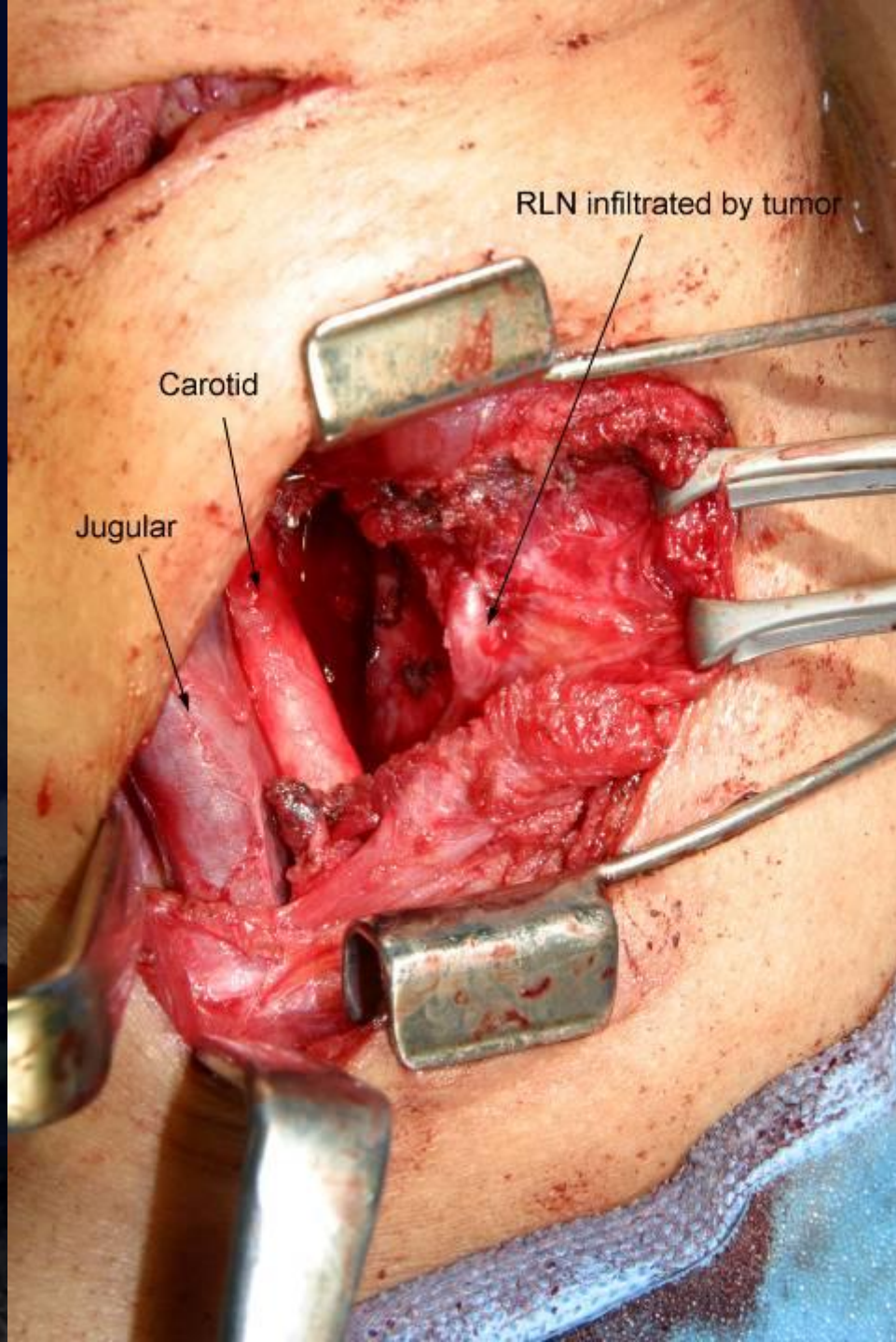
Jugular Vein

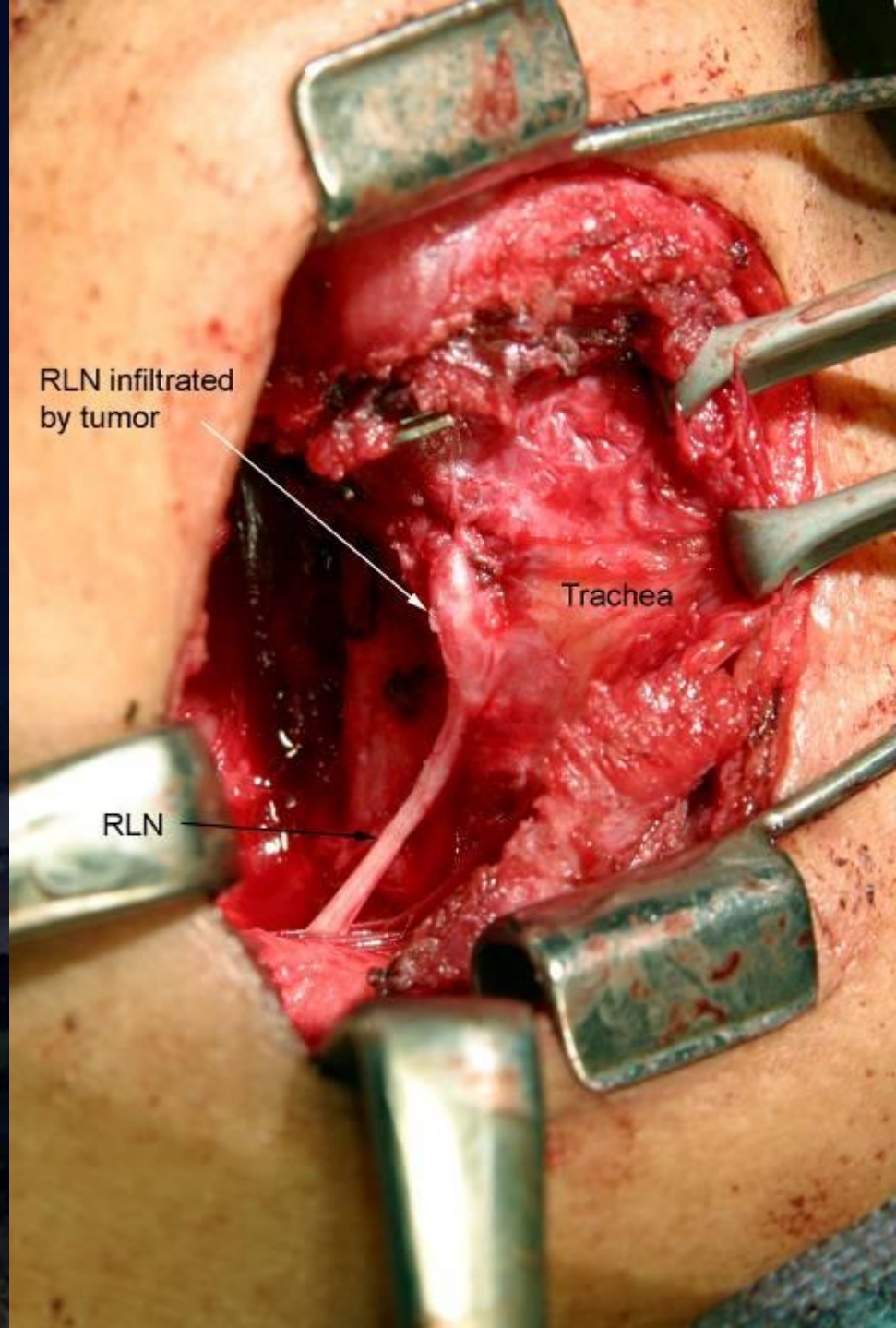
RLN



RLN

Diseased
node

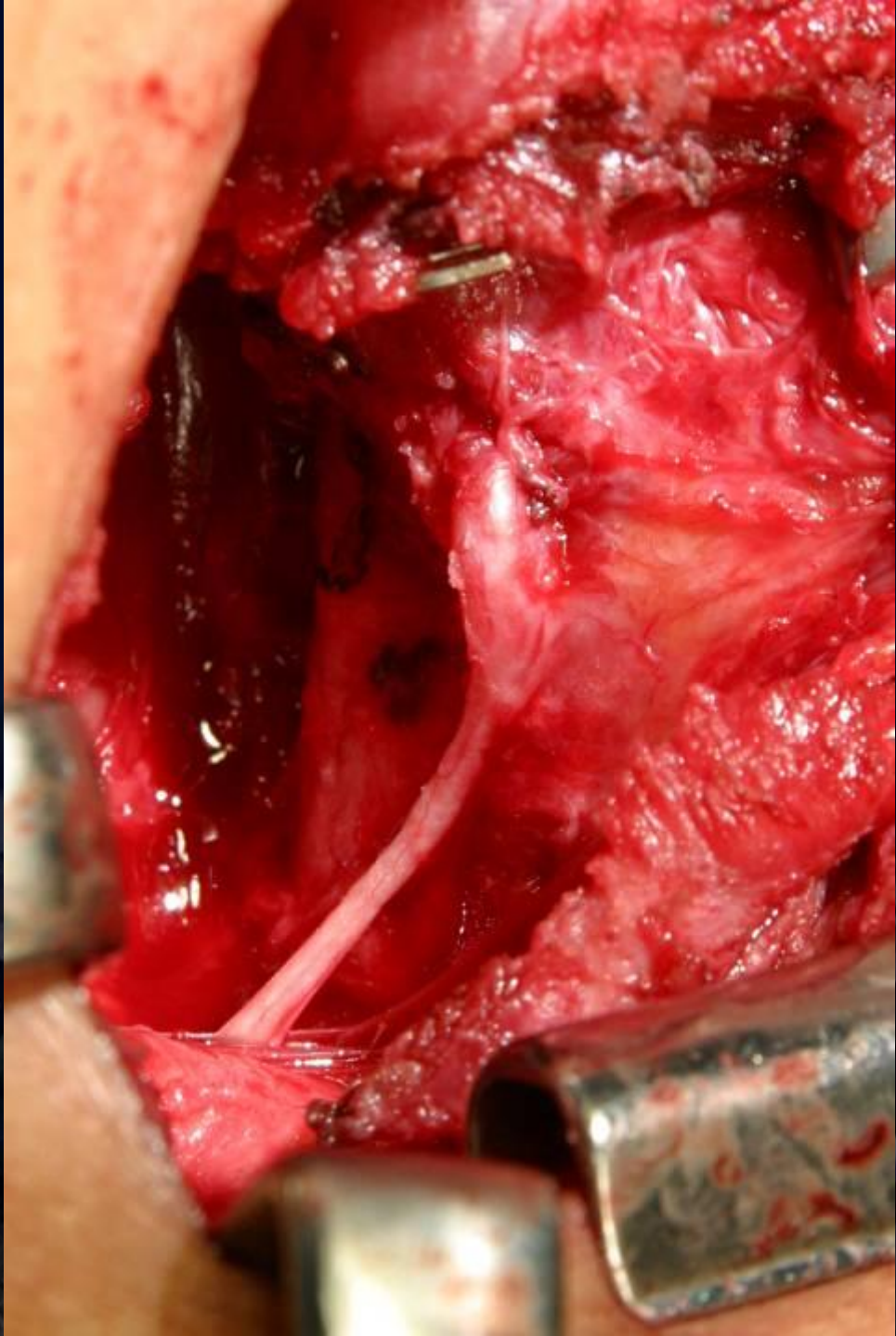




RLN infiltrated
by tumor

Trachea

RLN



Recovering from thyroid cancer surgery

- Stretching – it works!
- Myofascial release and other deep massage techniques
- Minimize trauma of surgery



Scar appearance 1 yr after radical surgery for metastatic thyroid cancer



Stretching exercise after neck operation

Let's move slowly and fully at least three times a day.



1. Relax your shoulders and neck sufficiently.



2. Look down.



3. Turn your face to the right. 4. Turn your face to the left. (Be careful not to move your shoulders.)



5. Incline your head to the right.



6. Incline your head to the left.

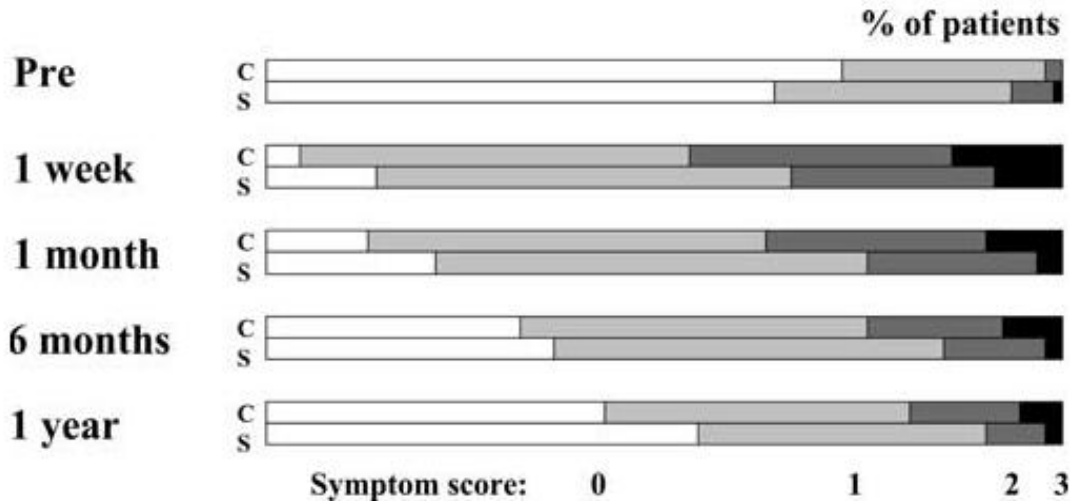


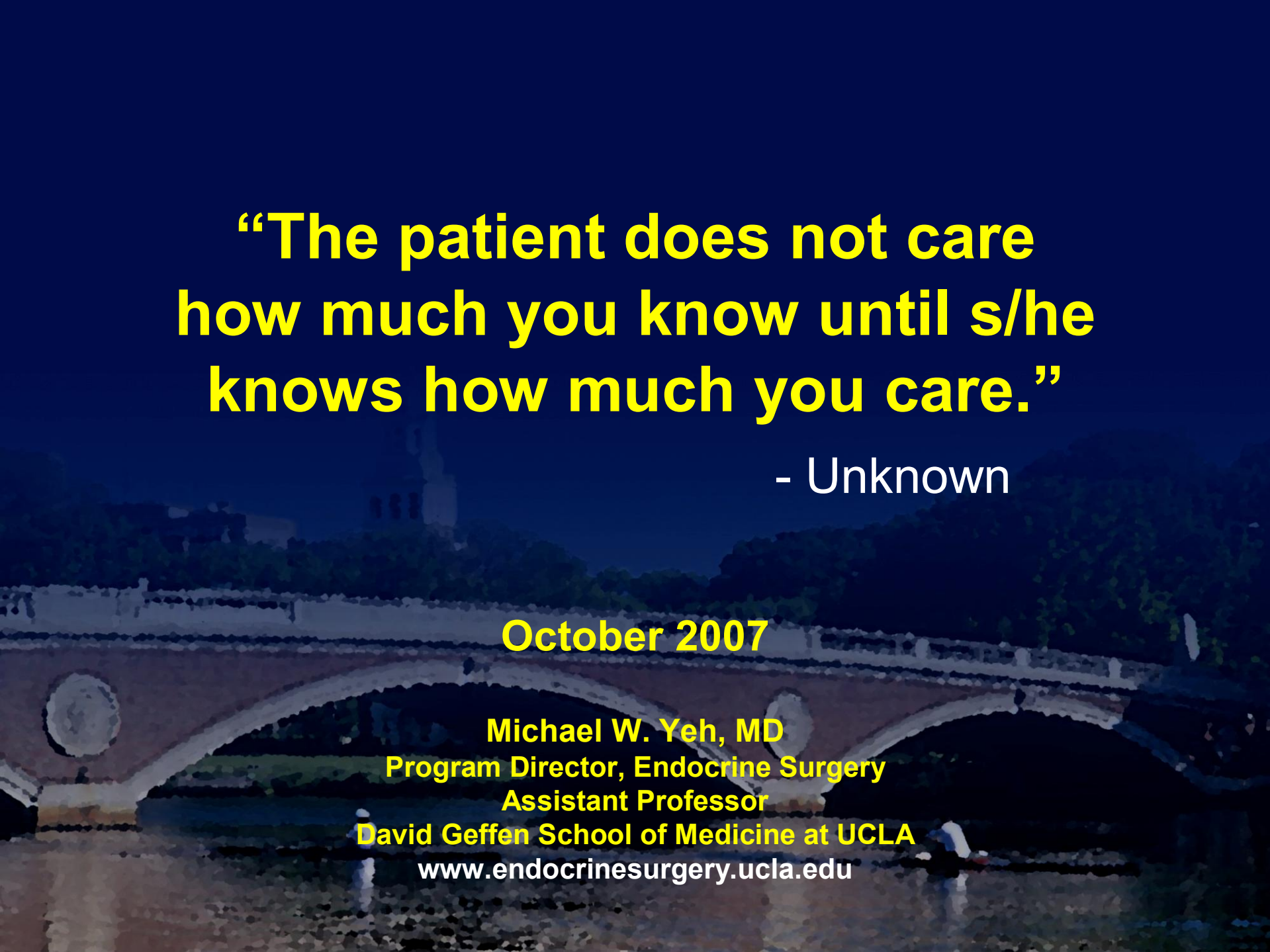
7. Turn your shoulders round and round.



8. Slowly raise your hands fully then lower them.

Takamura Y, Stretching exercises to reduce symptoms of postoperative neck discomfort after thyroid surgery: Prospective randomized study, World J Surg 2005





**“The patient does not care
how much you know until s/he
knows how much you care.”**

- Unknown

October 2007

Michael W. Yeh, MD

Program Director, Endocrine Surgery

Assistant Professor

David Geffen School of Medicine at UCLA

www.endocrinesurgery.ucla.edu



David Geffen School of Medicine



UCLA

Endocrine Surgery