10 Top Tips in Thyroid Surgery

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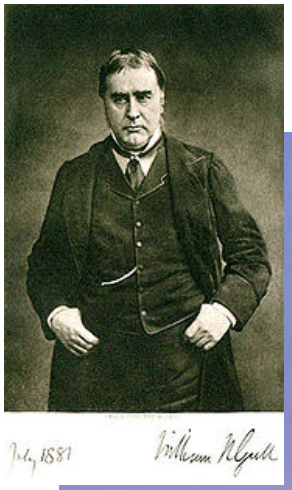
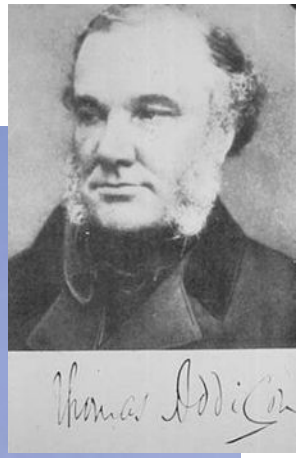
Conflicts of Interest
None to declare

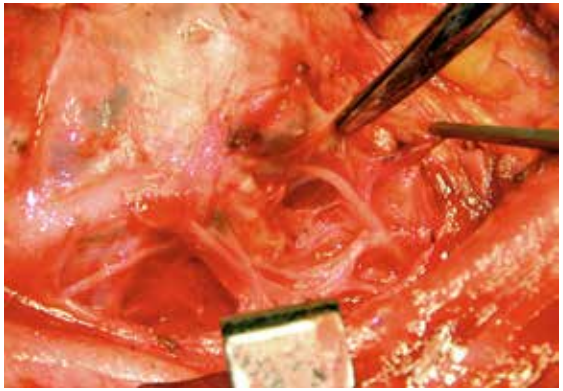
Guy's and St Thomas' NHS

NHS Foundation Trust



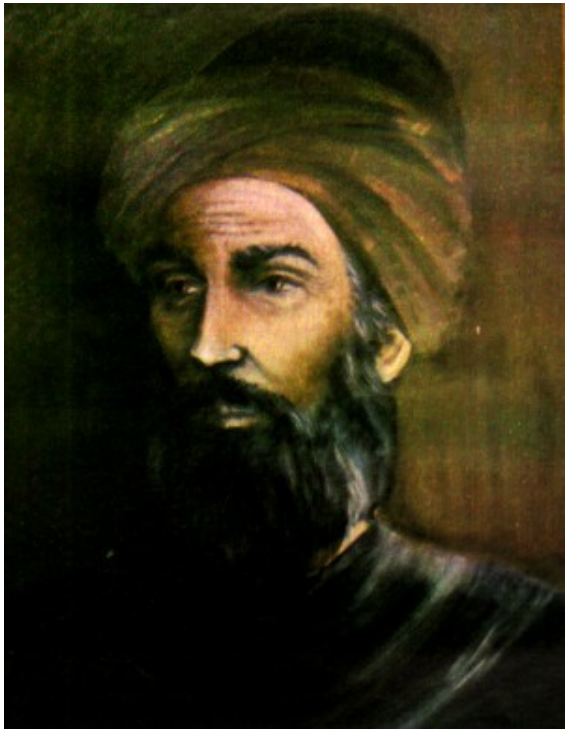


Claudius Galen



Historical Background

Abu Al-Qasim (El-Zahra 936-1013) in Al-Tasrif 952 AD
“First goitre excision”



Historical Background

- Diffenbach 19th Century – "**One of the most thankless, most perilous undertakings which if not altogether prohibited, should at least be restricted"**

- Gross US - **Thyroid surgery is a "horrid butchery…deserving of rebuke and condemnation, and that "no honest and sensible surgeon ever engage in it"**

The European Masters

Theodor Billroth (1829-1894)

-Tetany and no myxoedema -

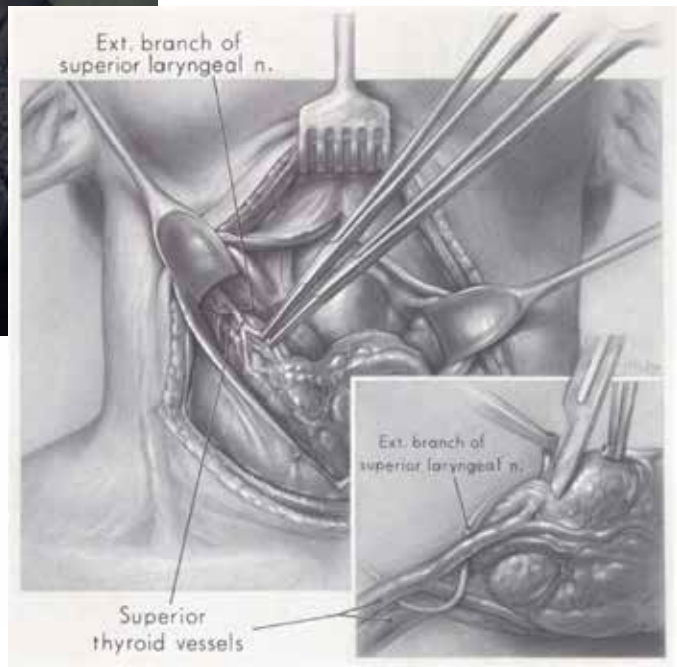
Theodor Kocher (1841-1917)

- Myxoedema but no tetany -

William Halstead (1852-1922)

The continuing development of the technique of thyroidectomy

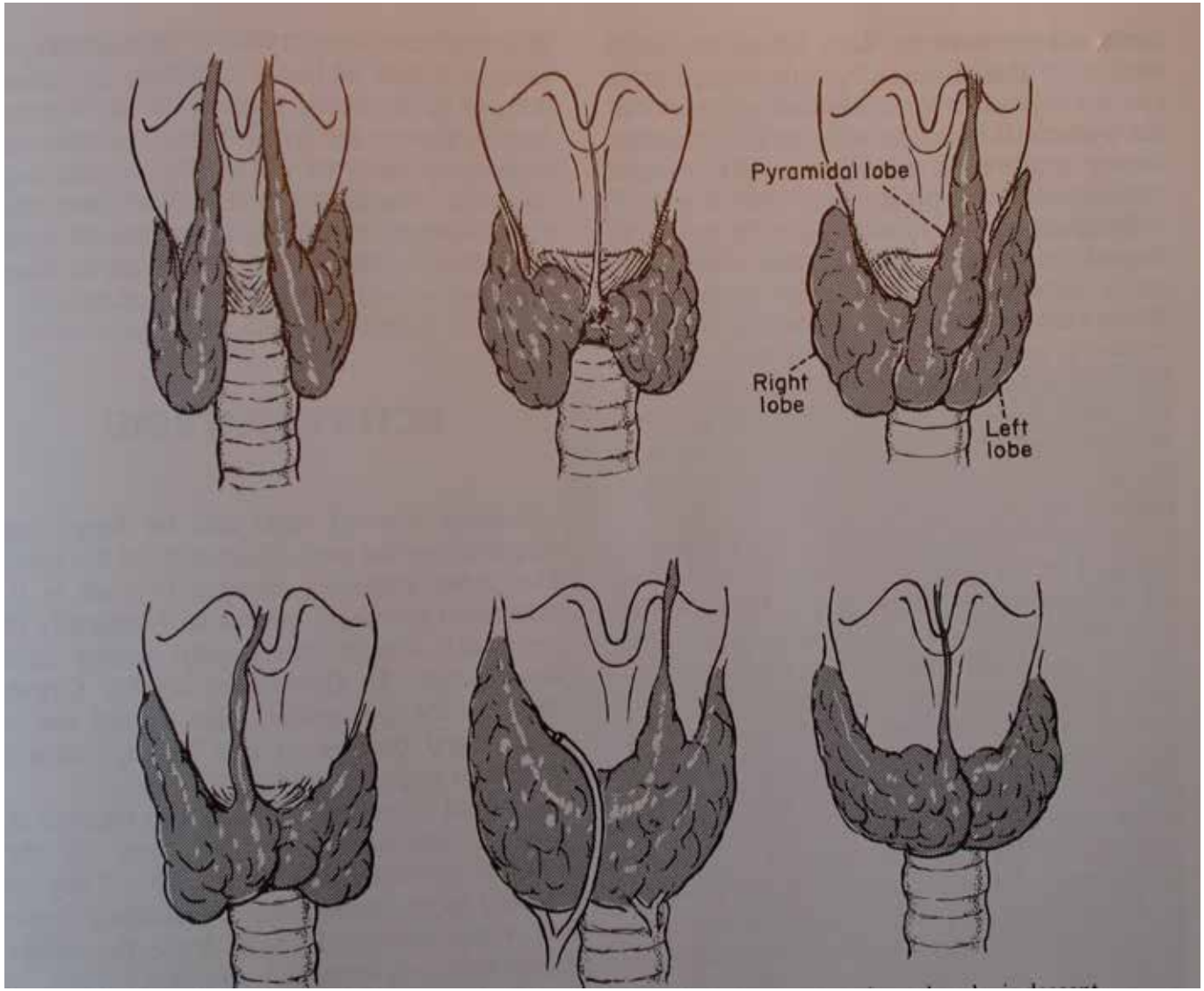
Norman W. Thompson, M.D., William R. Olsen, M.D., *and* Gary L. Hoffman, M.D.,
Ann Arbor, Mich.



Tip 1

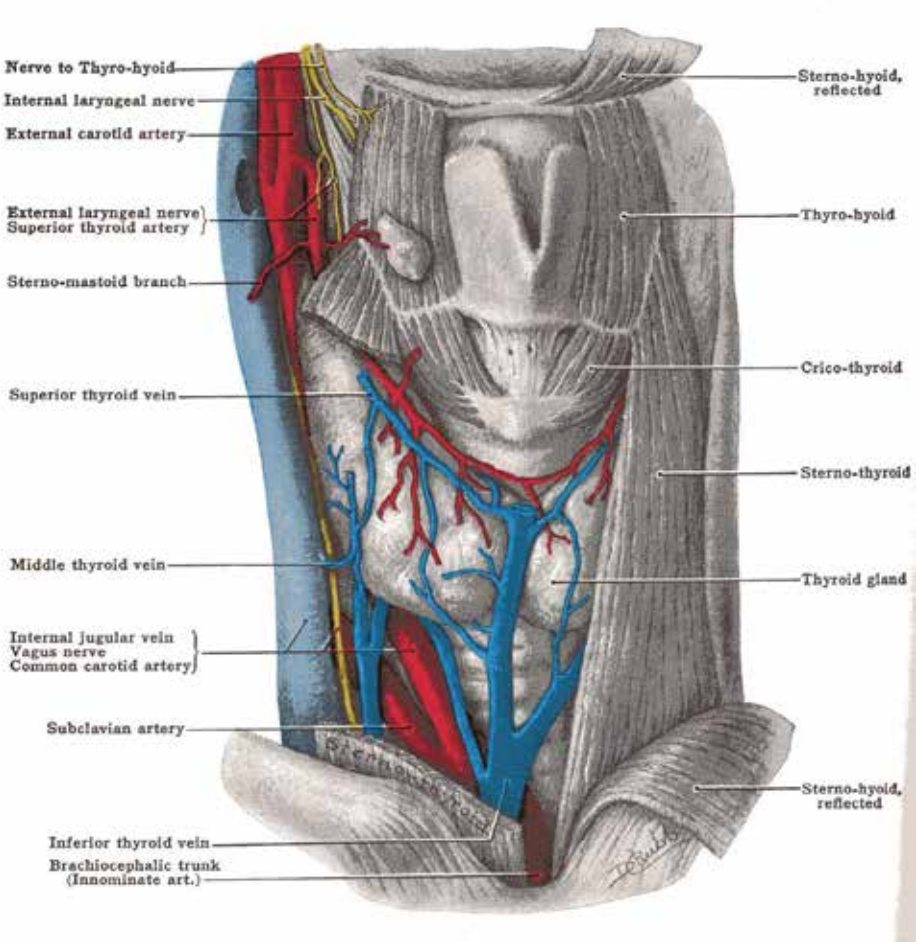
Know your anatomy and your embriology!

Embriology



Surgical Anatomy

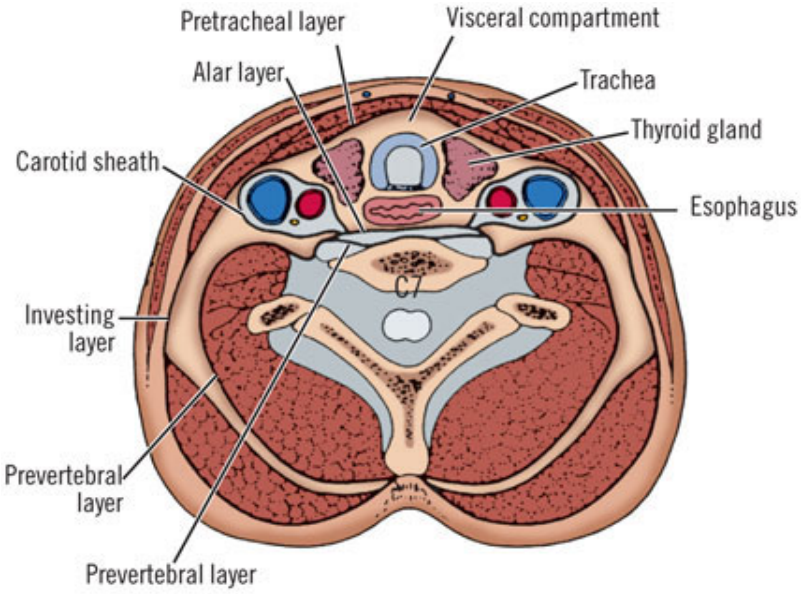
- Skin
- Subcutaneous fat
- Investing cervical fascia
- Strap muscles
- Thyroid gland
- Vascular structures
- RLN/SLN
- Parathyroids
- Trachea
- Thyroid cartilages



Surgical Anatomy

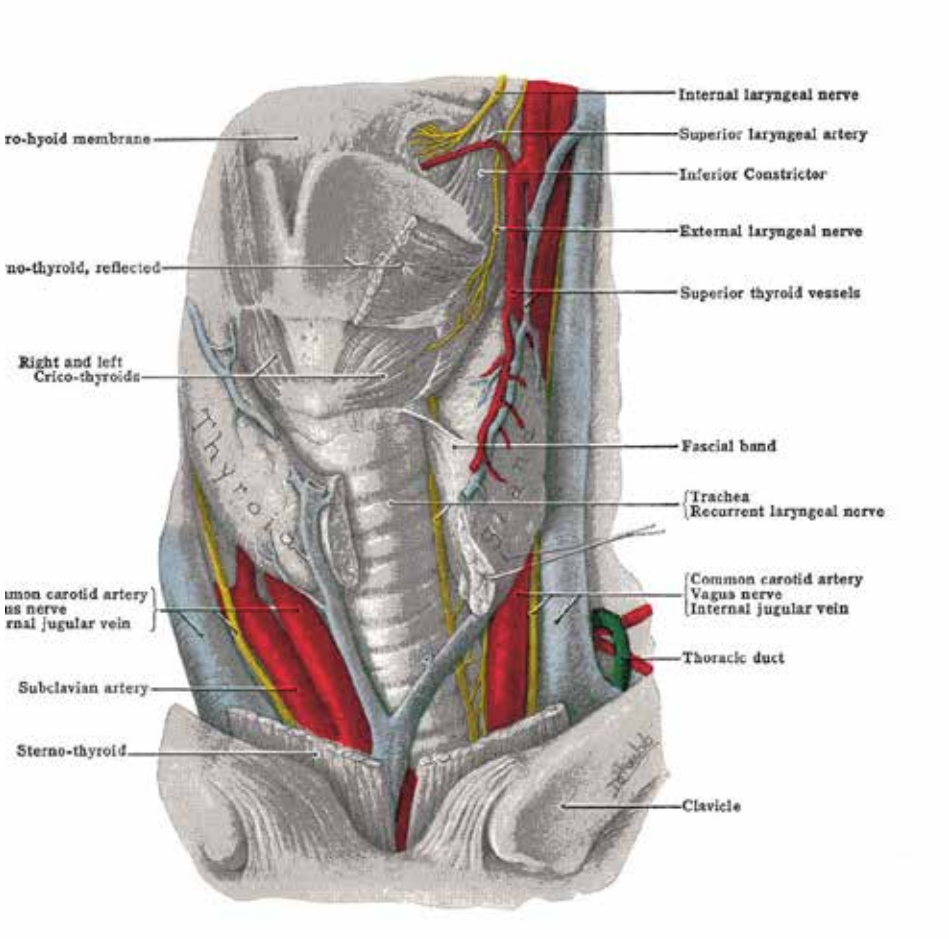
Fascial Neck Spaces

- Superficial Fascia
- Deep Cervical Fascia
  - Investing fascia
  - Pre-vertebral fascia
  - **Pre-tracheal Fascia**
  - Carotid Sheath



Surgical Anatomy

- **Vascular supply**
  - STA from ECA
  - ITA from TCT
  - STV
  - MTV
  - ITV
- **Neural structures**
  - Recurrent Laryngeal Nerve
  - External Branch Superior Laryngeal Nerve

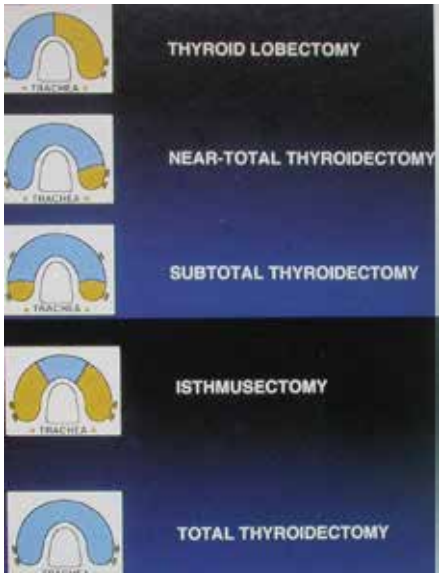


Tip 2

Know your indications and be precise on the extent

Aim of thyroid surgery

- **Resolution of the pathology**
  - Total thyroidectomy
  - Near-total thyroidectomy
  - Thyroid lobectomy with isthmusectomy
  - Subtotal thyroidectomy!!!!
- **Minimal complications**
  - RLN and EBSL
  - Parathyroid glands



Management Principles

- Adequate excision of gross tumour
- Preservation of functioning structures – allowing breathing, swallowing and phonation
- Preservation of vital structures
- Use of adjuvant therapies

Patel and Shaha 2005, British Thyroid Association 2014, ATA Guidelines 2012

AMERICAN THYROID ASSOCIATION
ATA | Founded 1923

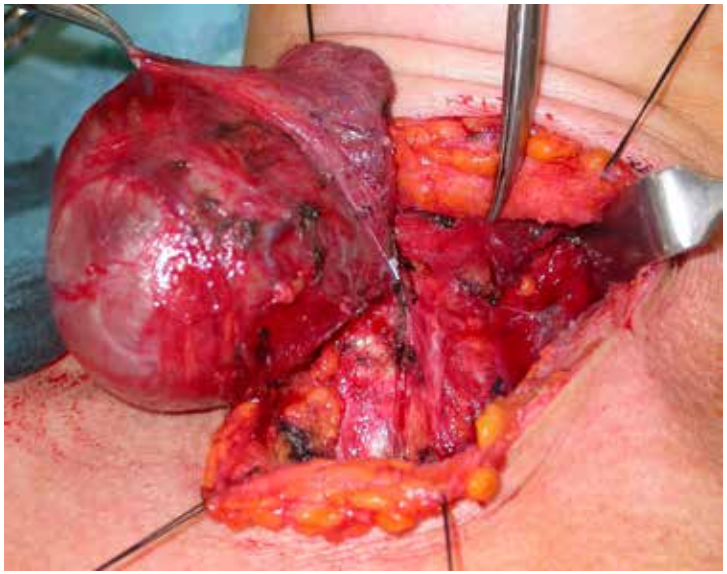
Does the patient needs the surgery?

Will the patient benefit from the surgery?

Which would be the optimal extent of the surgery?

Surgery for thyroid nodules

Thy 3f: Bethesda 3 and 4 - Follicular Thyroid Neoplasm



- **29%** of Thy 3 are cancers
- **"Diagnostic"** Total lobectomy with isthmusectomy
- Level VI exploration
- Identification & preservation of RLN
- Identification & preservation Parathyroid glands
- The diagnostic lobectomy should be therapeutic.

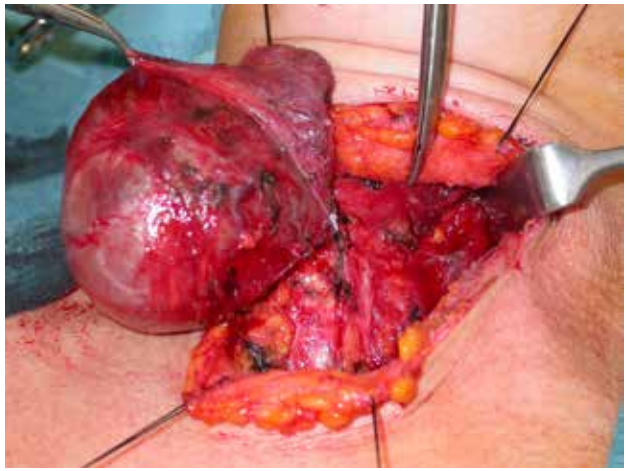
Tysome el al BJS 2009

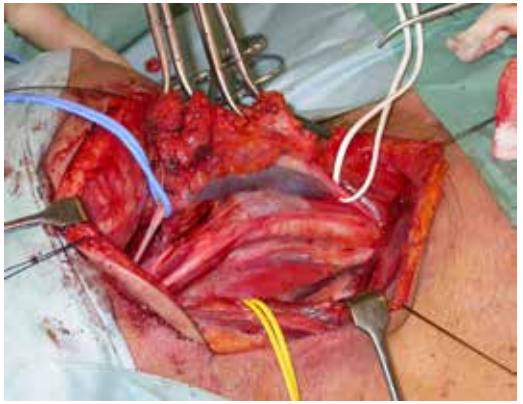
Solitary Thyroid Nodule

Thy 4: Bethesda 5 - Suspected Malignancy

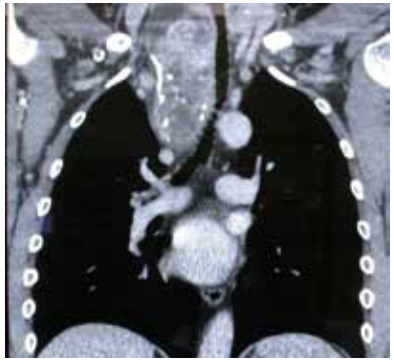
- **Lobectomy** – STN less than 3 cm in low risk patients and negative USS of contralateral lobe
- **Lobectomy with frozen section and proceed** – Sensitivity 20%
- **Total thyroidectomy** – Multinodular goitres with compression symptoms and high risk patients

Pang et al Sub to Clin Oto





Multinodular Goitre



MNG

Benign FNAC

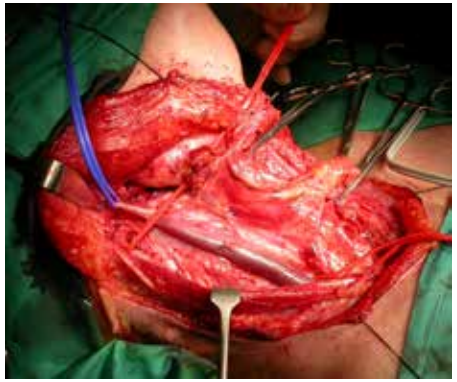
Unilateral Growth

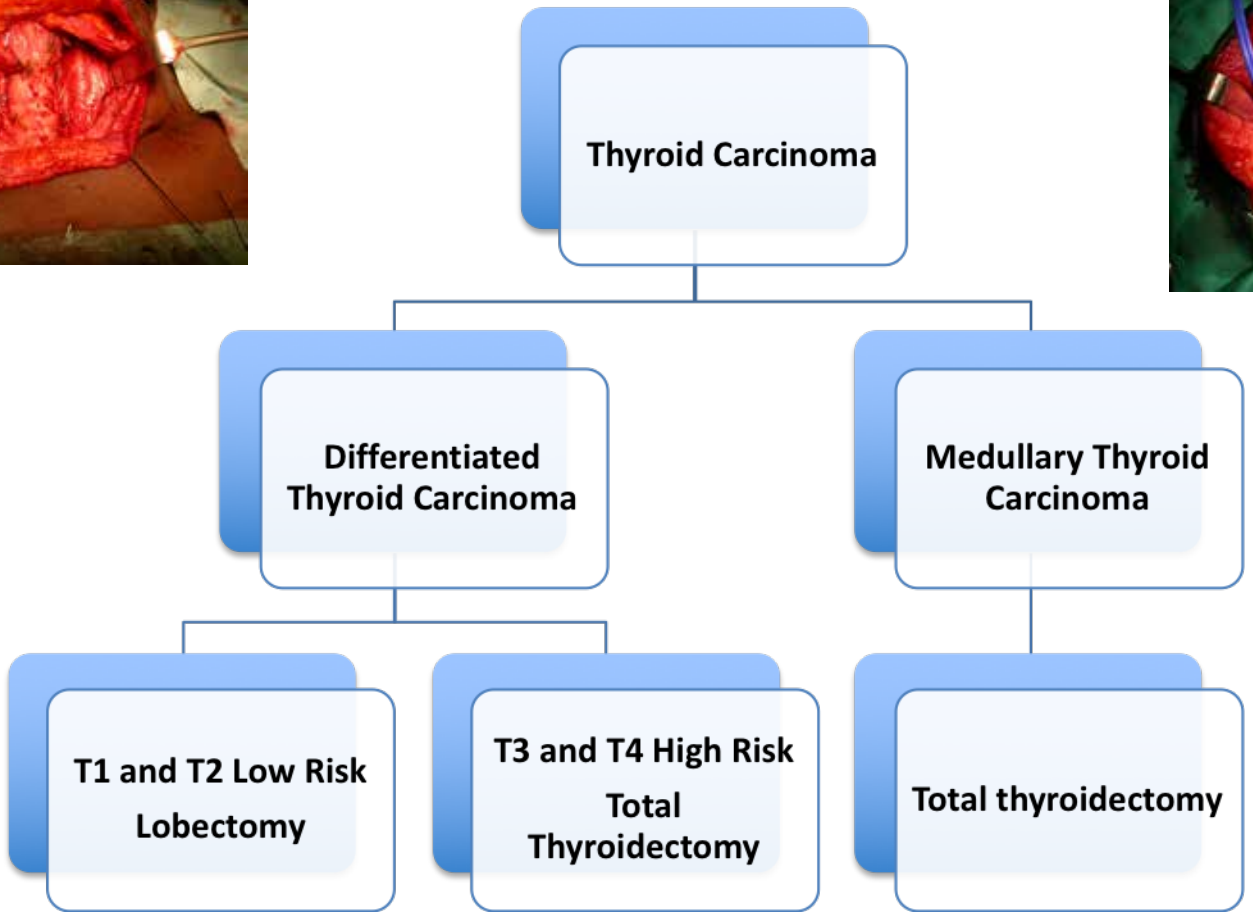
Bilateral Growth

Lobectomy with isthmusectomy

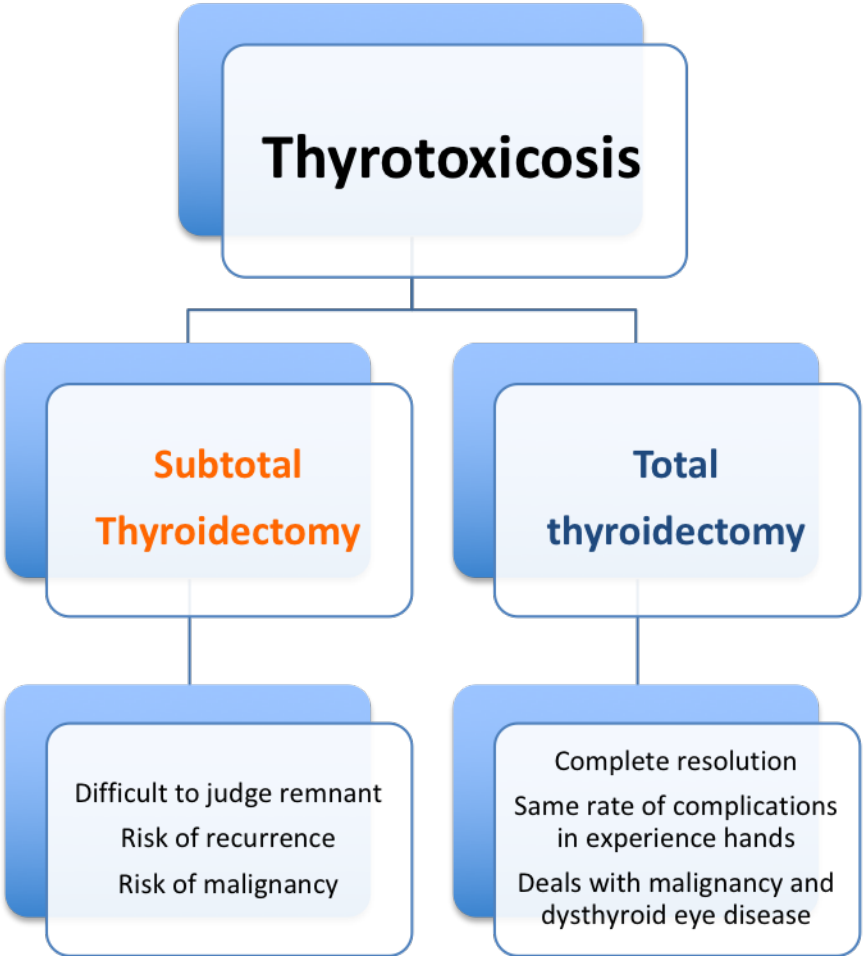
Total thyroidectomy

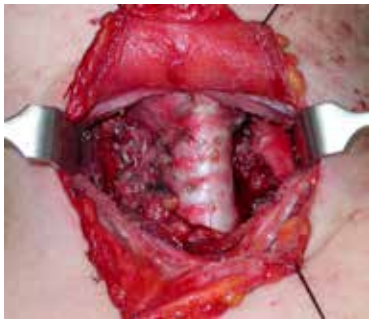
Thyroid Carcinoma





Thyrotoxicosis





Tip 3

Accurate Preoperative Planning

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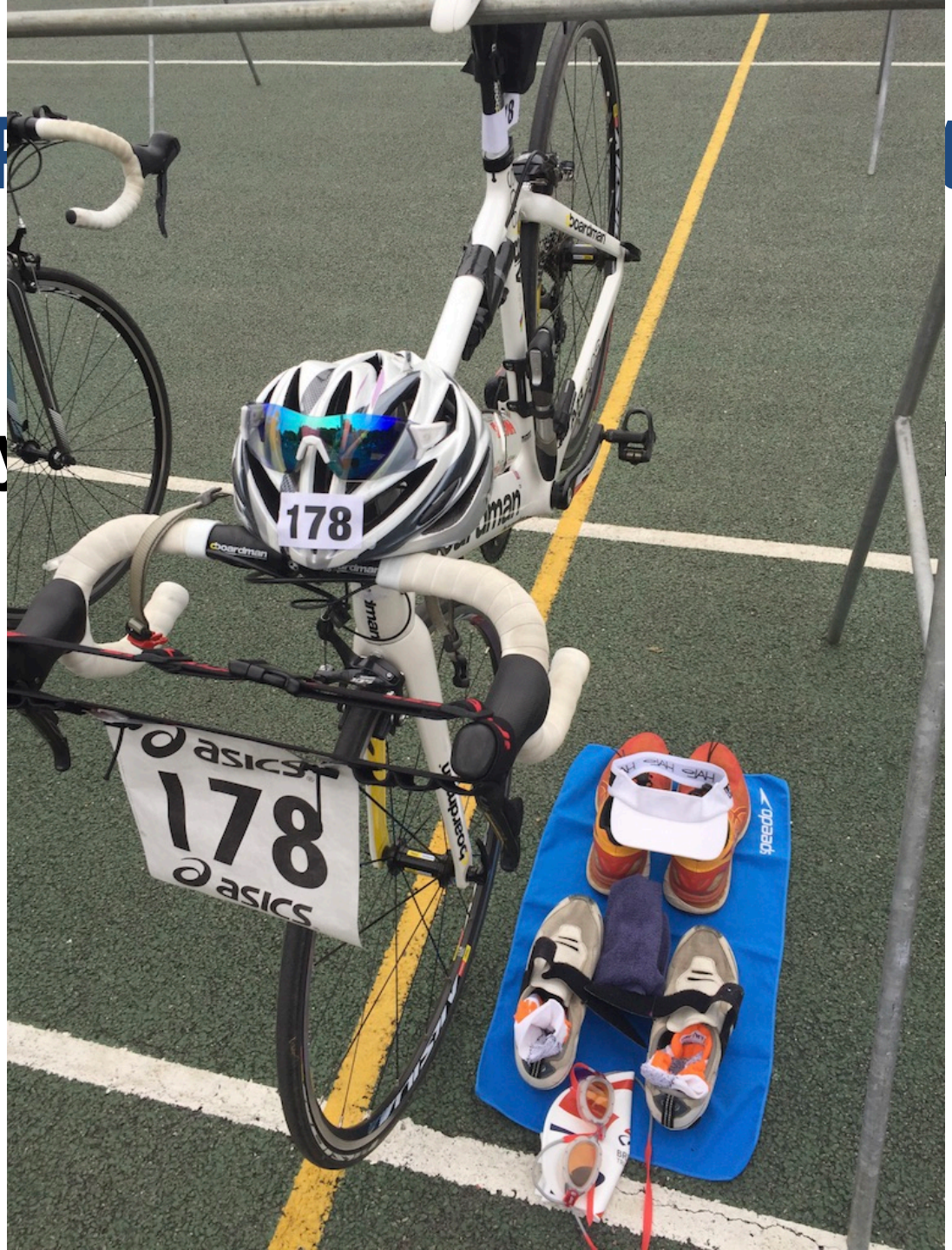
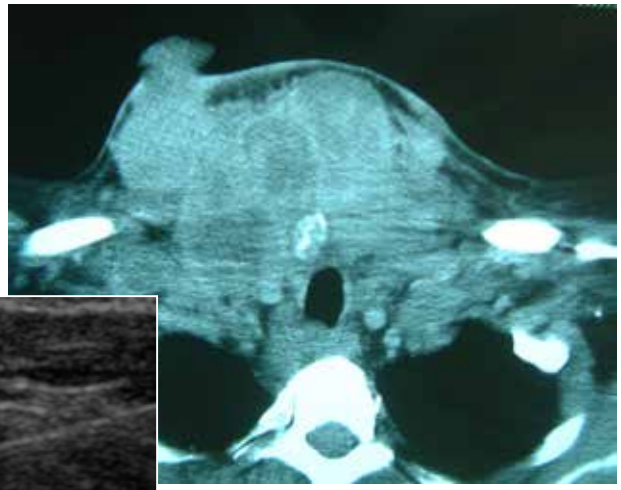
Thy ies

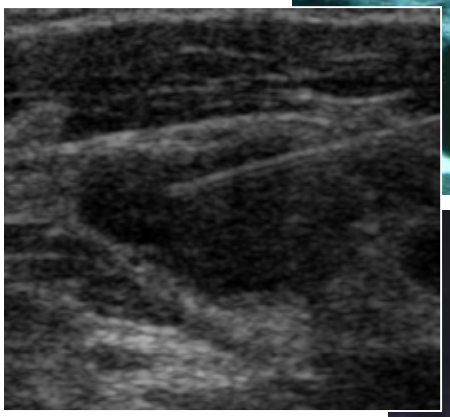


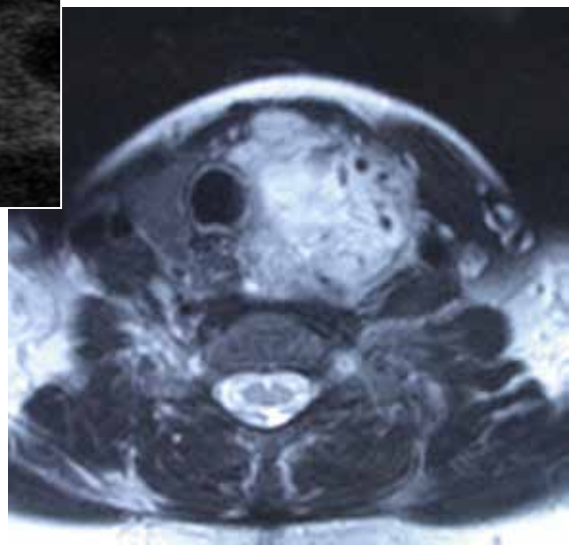
Preoperative Evaluation

Essential

- TFT, Thyroid antibodies
- **USS guided FNAC/CNB**
- CT Scan
- Magnetic Resonance Scan
- PET-CT





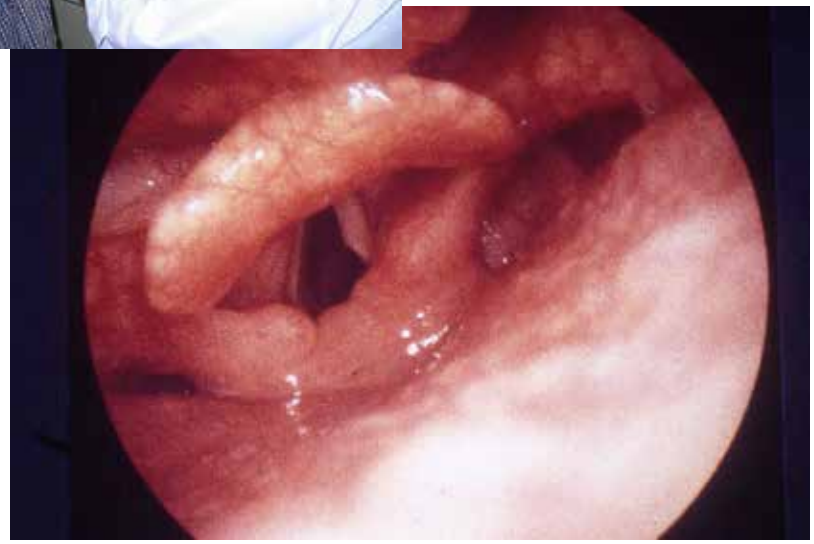


Patel and Shaha 2005, Czaja McCaffrey 2006, Seo et al 2010

Preoperative Evaluation

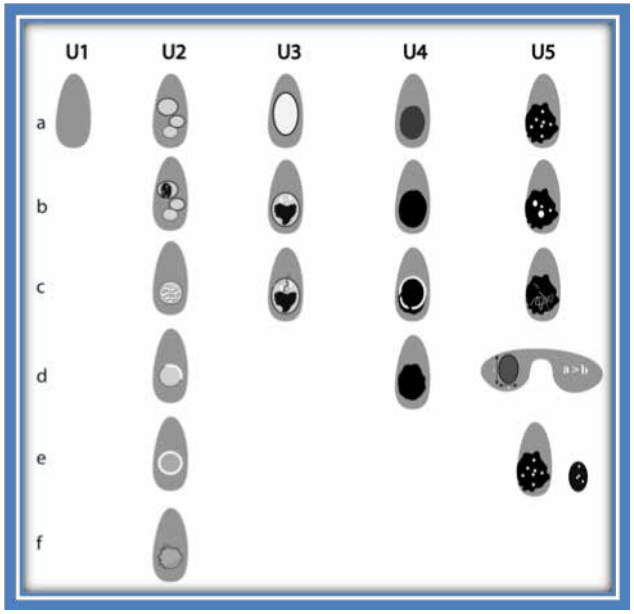
Pre-operative fibreoptic laryngoscopy

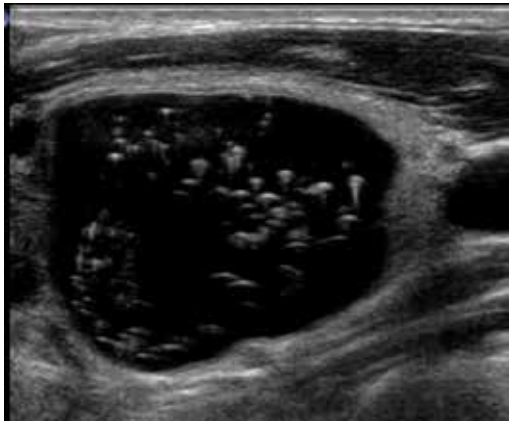
- Essential
- Provides a dynamic view
- Essential medico-legal investigation
- Direct laryngoscopy if laryngo-tracheal invasion is suspected

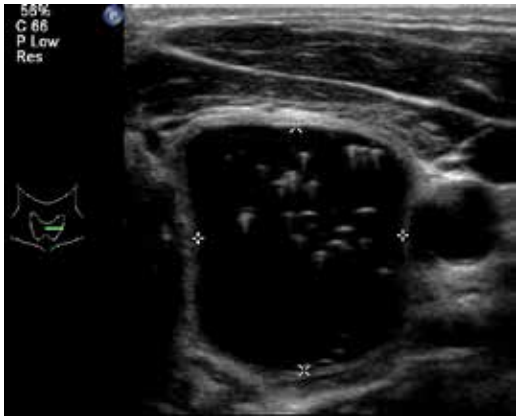


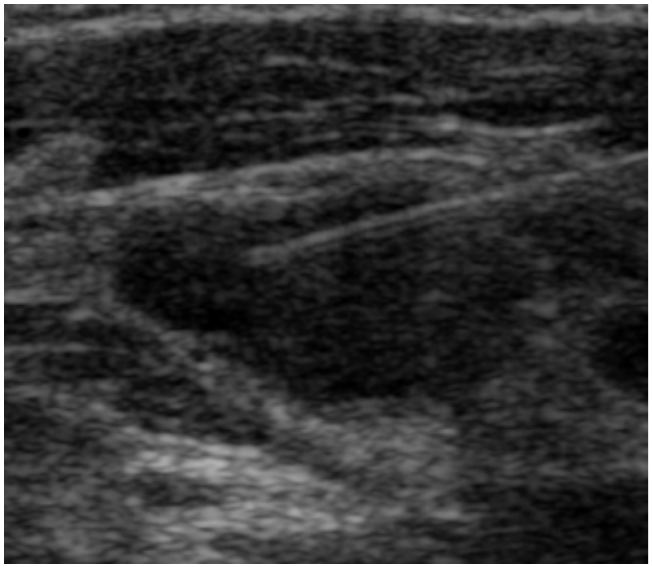
Jeannon and Simo 2009, Czaja McCaffrey 2006

Ultrasound Guided FNAC Evaluation





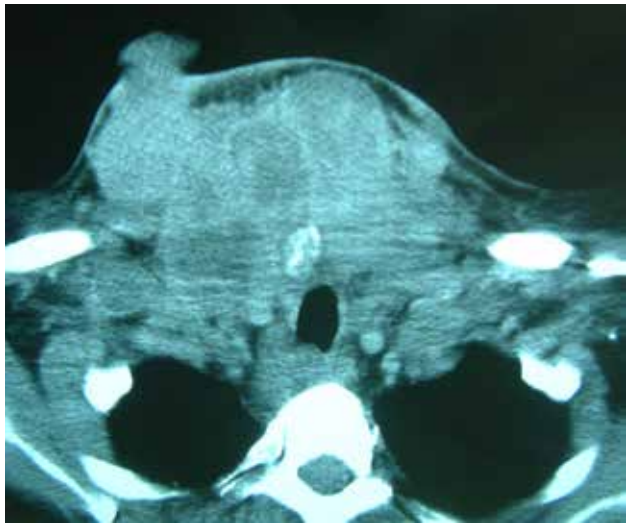


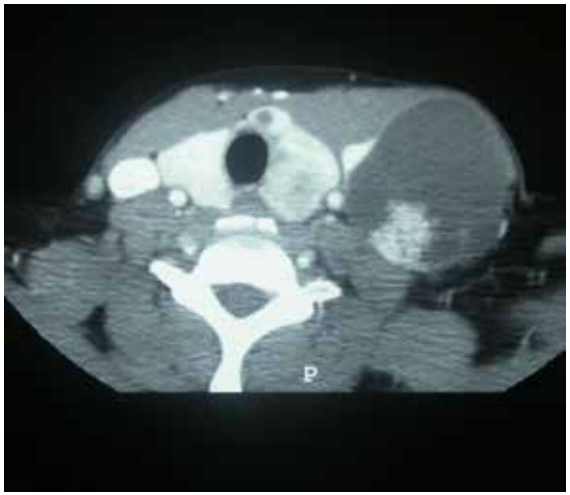


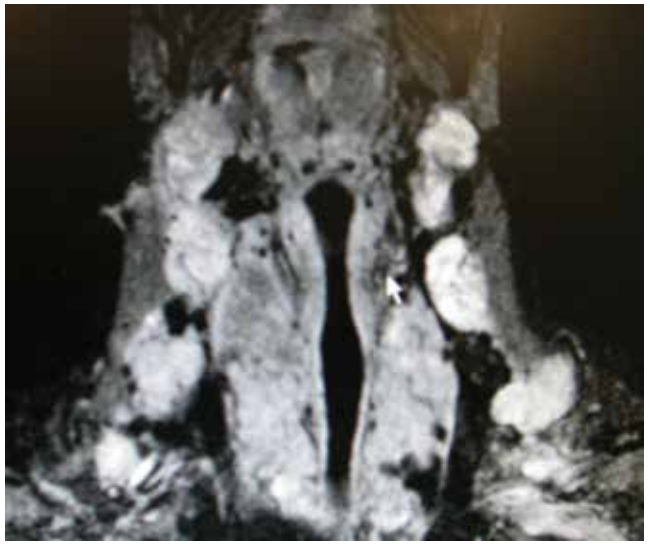
Patel and Shaha 2005, Czaja McCaffrey 2006 BAETS 2014

Cross Sectional Imaging – CT or MRI

- Staging investigations
- Thyroid cancer
- MNG with compression symptoms and intrathoracic extension



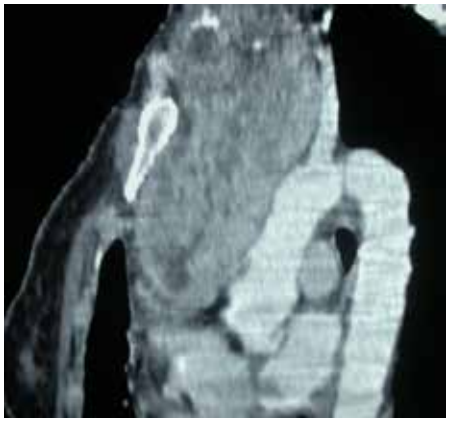




Multiplanar CT

- **CT with multiplanar views** – Tri-dimentional views
- With **contrast except when patients have allergy to iodine contrast**
- Predictor of surgical approach

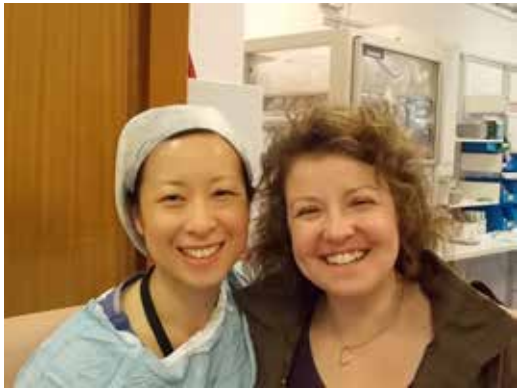
Huins et al, Int J Surg 2007,
Pollard et al Am J Neuroradiol 2005,
Grainger et al ORL H&N Surg 2005




Preoperative Evaluation

- **Multidisciplinary Team approach essential**
- Dedicated and experienced surgical team
- Thoracic, Plastics and UGI teams available

Simo and Jeannon 2009, Czaja McCaffrey 2006, Patel and Shaha 2005

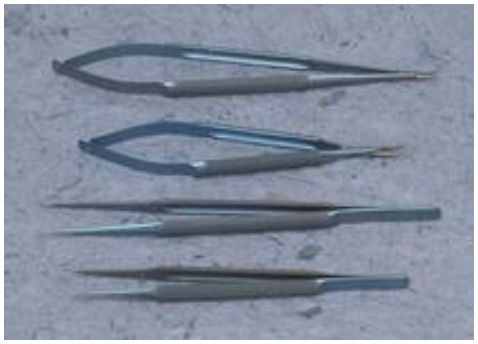


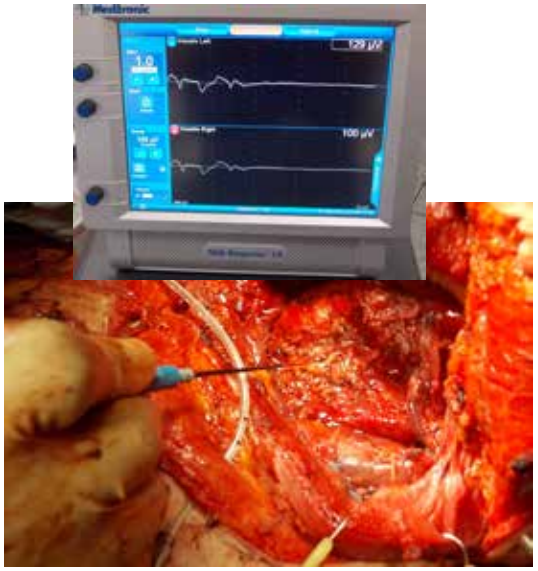
Tip 4

Have up to date Surgical aids available and use them regularly

Surgical Aids

- Use of neuromonitoring
- Surgical Loopes
- Micro-instruments
- Powered Instruments – Haemostatatic devices and microdebrider





Surgical Aids

- Don’t start using them with the difficult case
- Ensure that you have received adequate training
- Troubleshooting
- Use them all the time

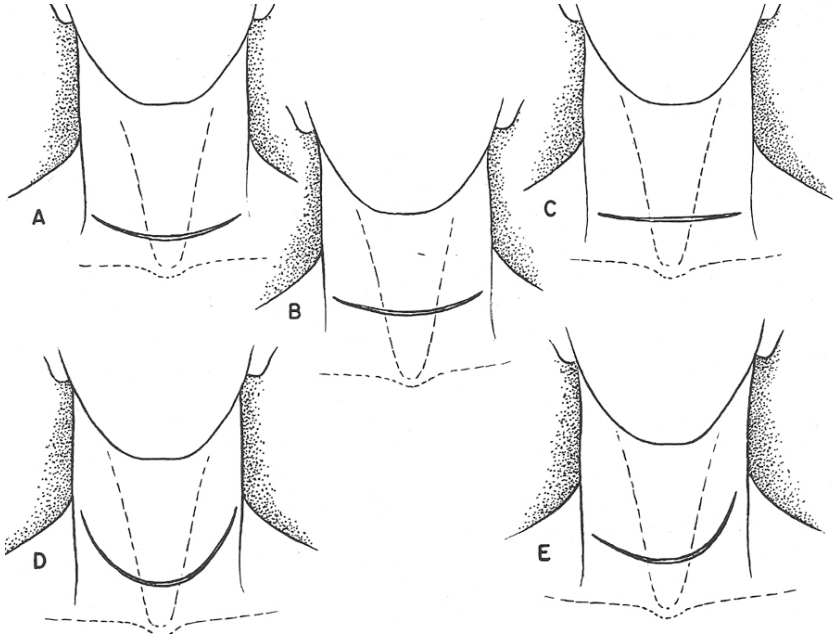
Tip 5

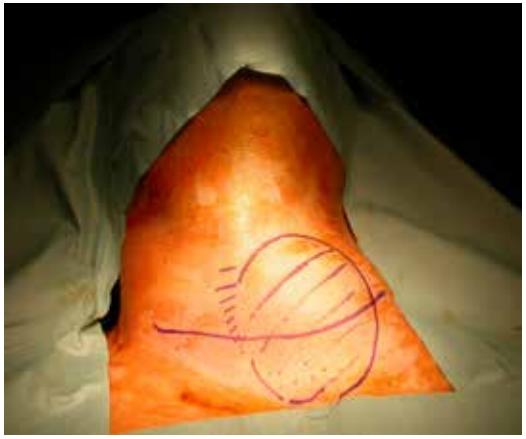
Plan carefully and be precised with your incisions as you will be remembered for it

Thyroidectomy

- ***Incision***

- Kocher incision. Transverse incision half-way through sternal notch and cricoid cartilage
- Follow the tension lines





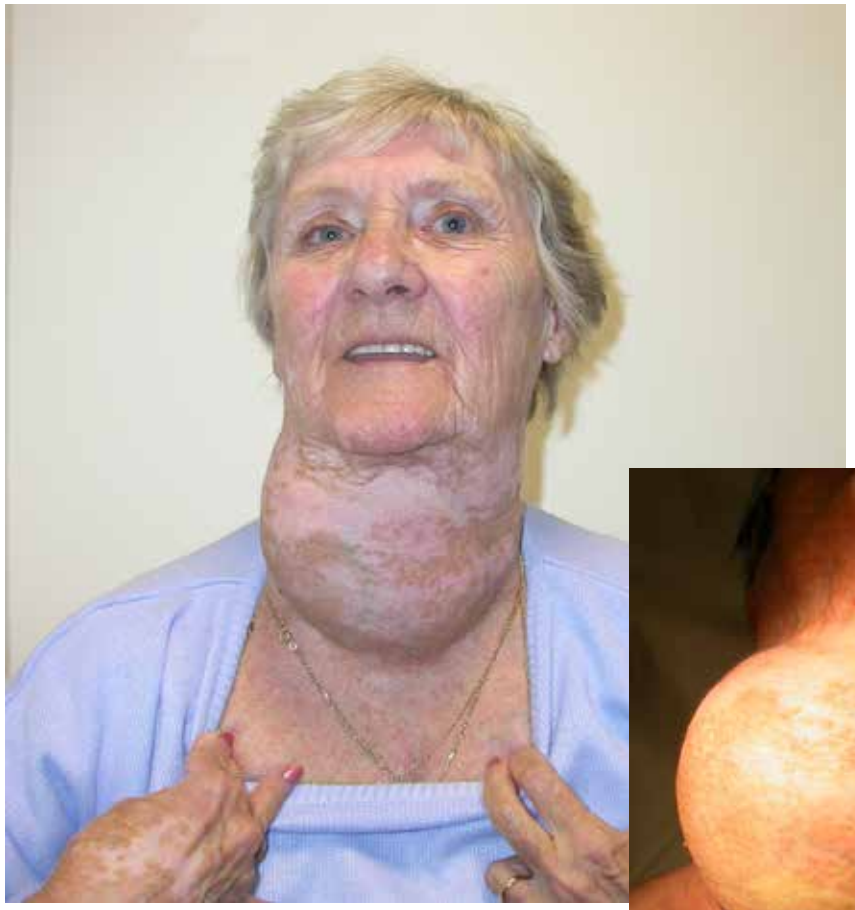
No excuse for a bad scar ?

Spot the difference!

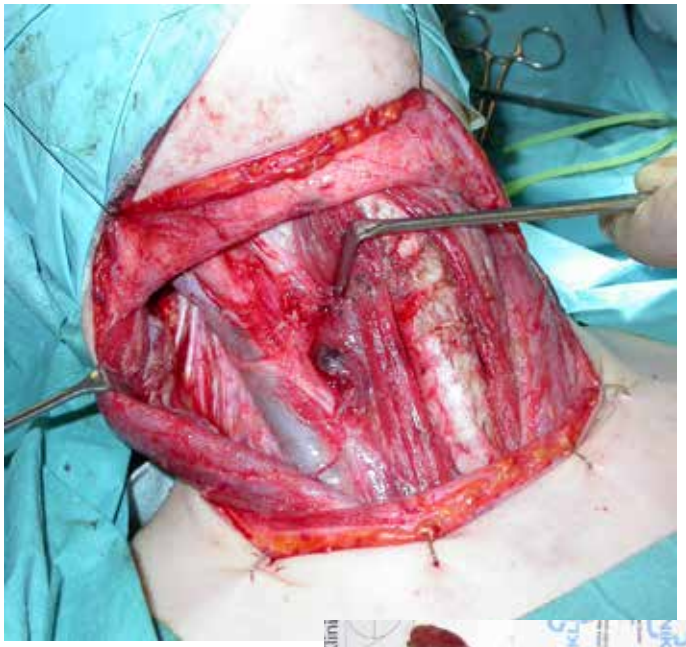
- **MIT – 2.5 cm**
- 23h stay
- TTO's CP and Paracetamol
- Scar satisfaction: Excellent

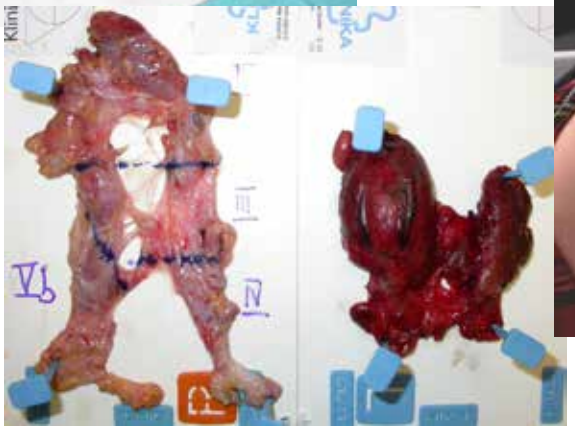
- **Conventional 4 - 5 cm**
- 23h stay
- TTO's CP and Paracetamol
- Scar satisfaction: Excellent

Patient Expectation 2019



Patient Expectation 2019





Tip 6

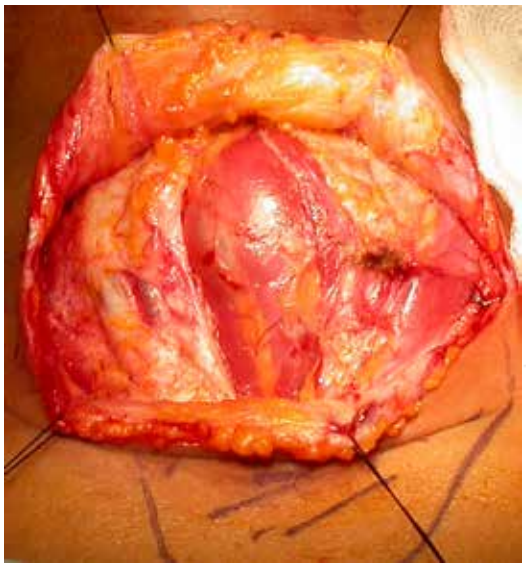
Don’t be conservative with your approach

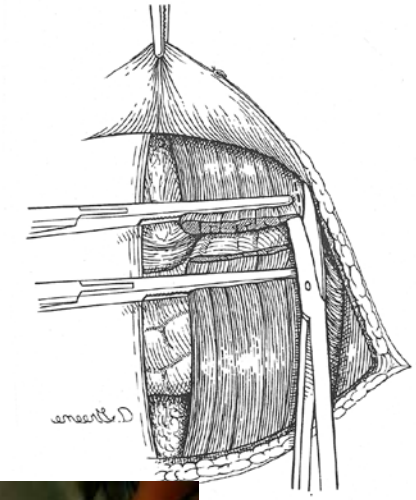
Thyroidectomy

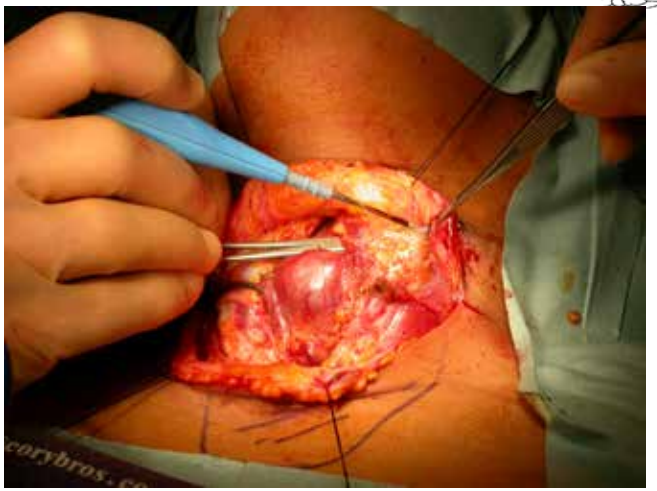
Approach

- Subplatysmal flaps elevated
- Incision cervical fascia
- Strap muscles identified, retracted or divided in the superior third

Space and view is essential

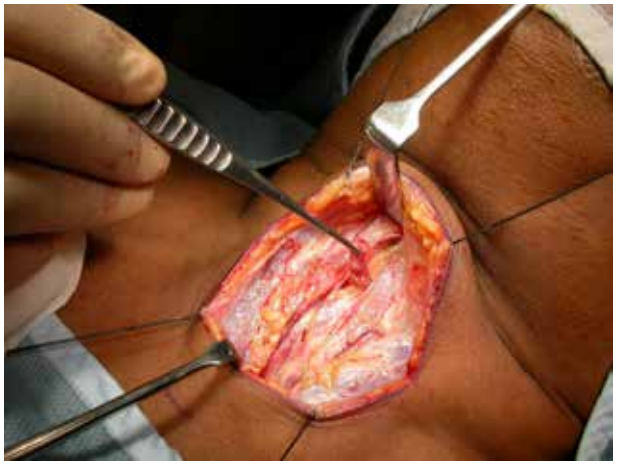






Don’t forget the Pyramidal Lobe!

- Common pitfall
- May need chasing to hyoid bone
- Beware of subclinical thyroglossal duct cysts



Tip 7

Be systematic with the Superior Vascular Pedicle and EBSLN

Thyroidectomy

Division Vascular Pedicles

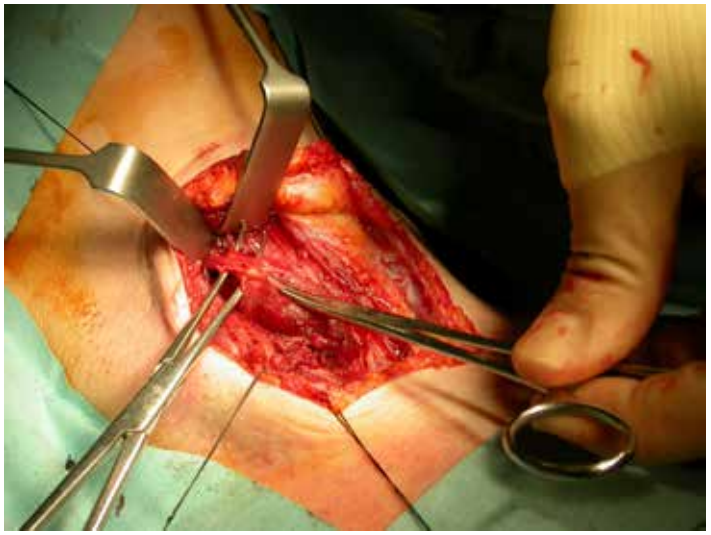
- Superior thyroid arteries and veins
- Mid thyroid veins
- Inferior Thyroid veins

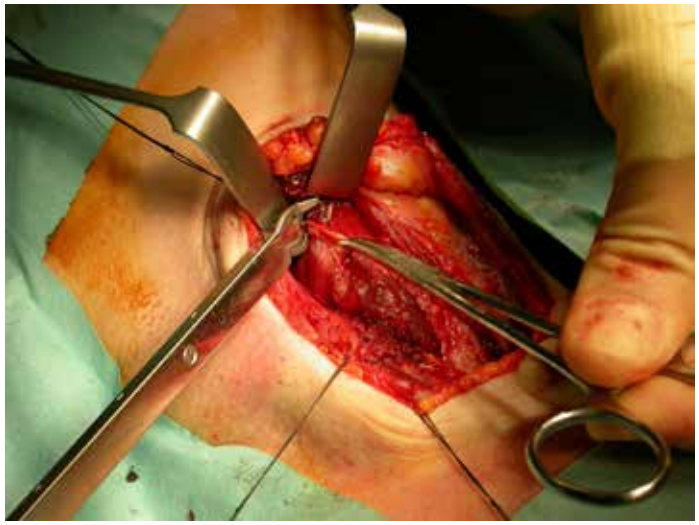
- Individual vessels identified and mass ligations avoided

Decrease risk of post-operative haemorrhage

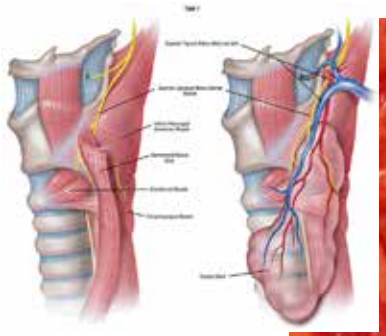
Decrease risk of EBSLN injury

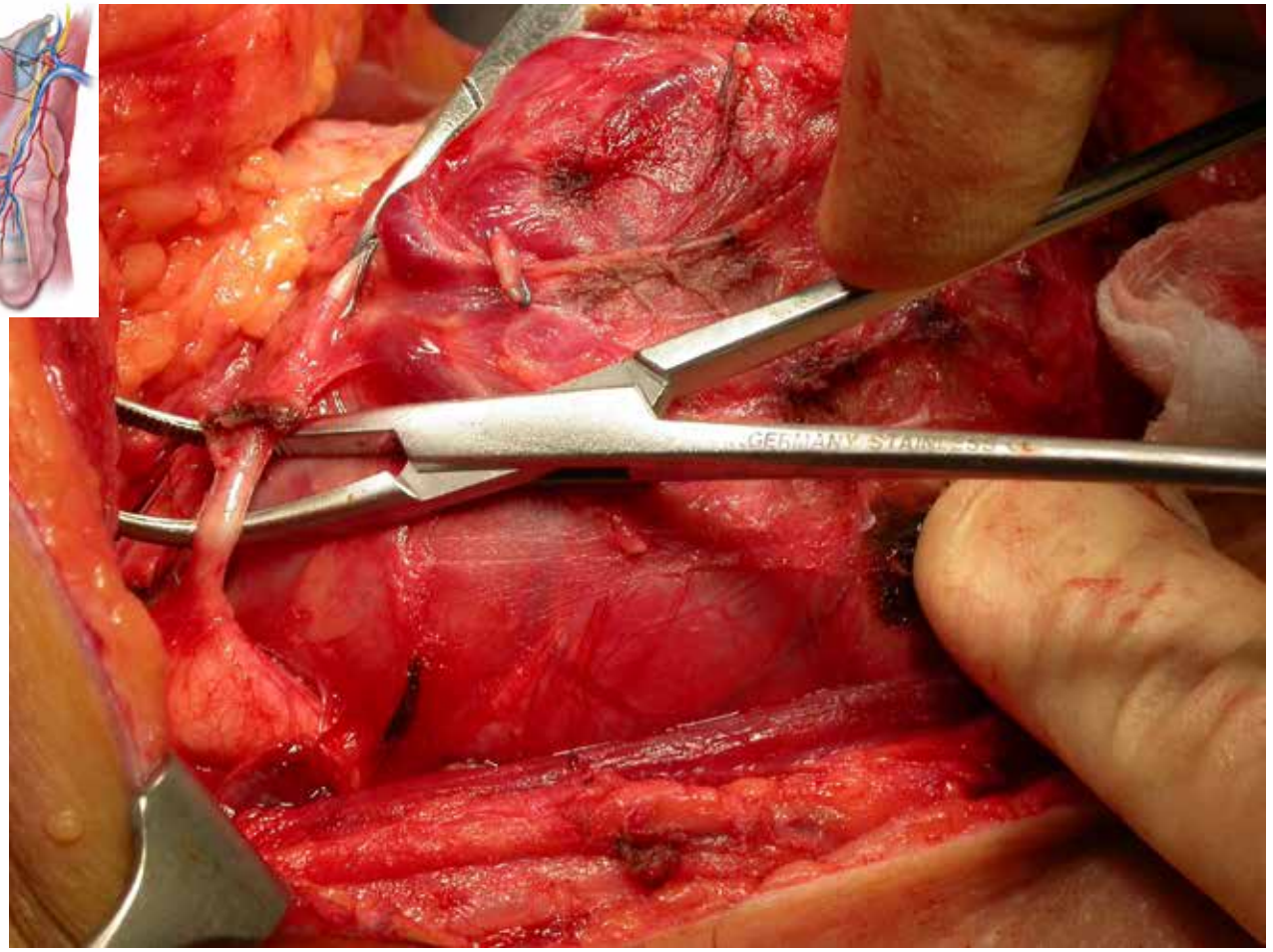
Decrease risk of leaving a thyroid remnant





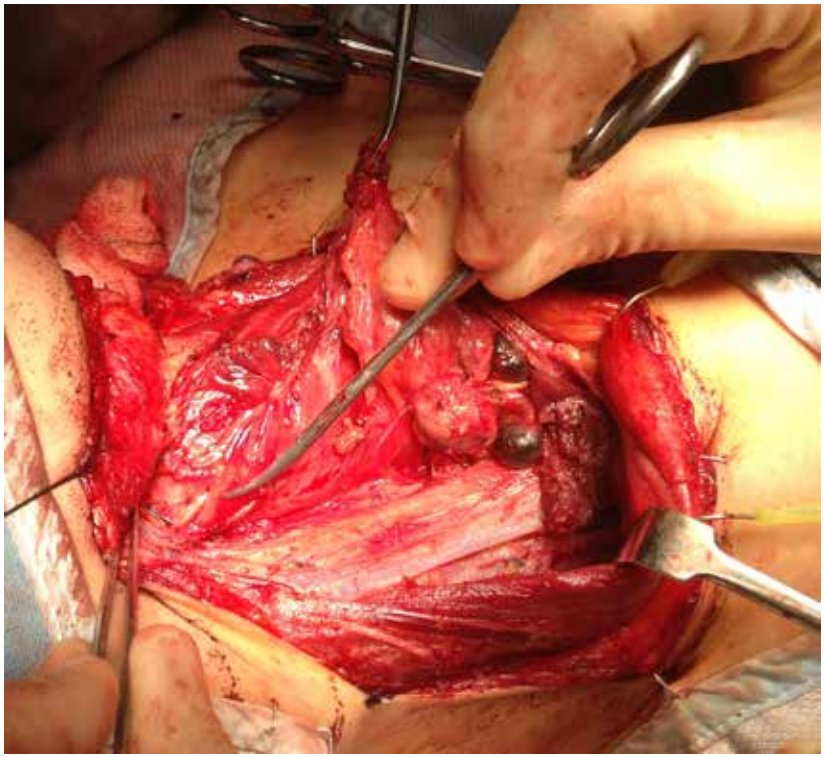
Superior Thyroid Pedicle





EBSLN Injury

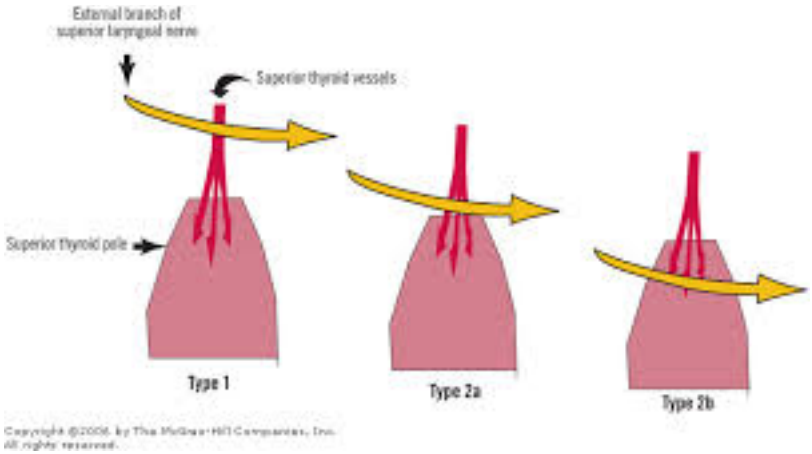
- The Nerve of Amelita Galli-Curci
- Failure to produce high pitches

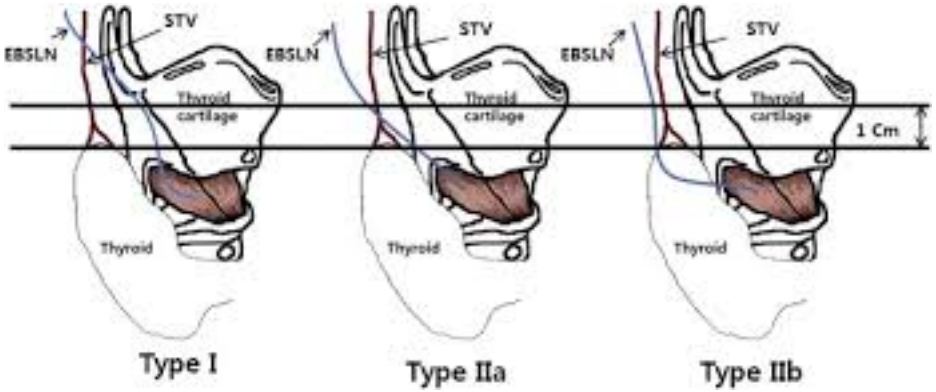


Superior Laryngeal Nerve

Cernea's Classification

- **Type 1:** Nerve crossing 1 cm or above horizontal plane superior thyroid pole
- **Type 2a:** Nerve crossing less than 1cm above plane
- **Type 2b:** Nerve below plane

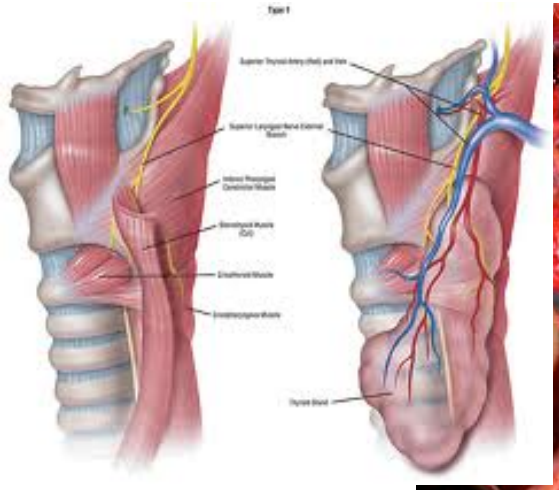


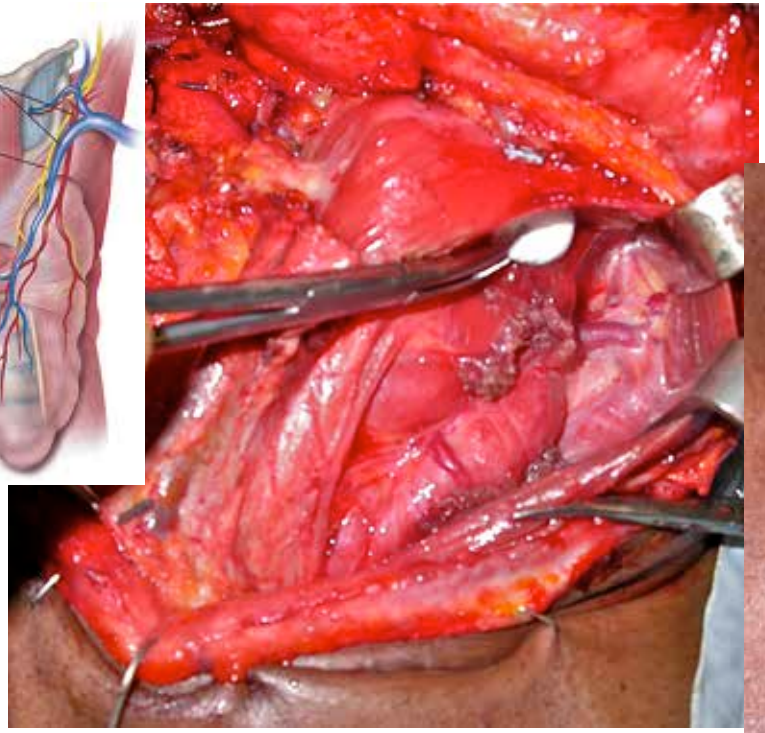


Cernea et al Head and Neck 1992

EBSLN

Type I: 60 to 68%
Type II: 20%
Type IIb: 14-20 %





Tip 8

Be critical with the identification and the dissection

of the

Recurrent Laryngeal Nerve

Voice Outcomes

Volume 148 Supplement 6 June 2013

Clinical Practice Guideline: Improving Voice Outcomes after Thyroid Surgery

Sujana S. Chandrasekhar, MD, Gregory W. Randolph, MD,
Michael D. Seidman, MD, Richard M. Rosenfeld, MD, MPH,
Peter Angelos, MD, PhD, Julie Barkmeier-Kraemer, PhD, CCC-SLP,
Michael S. Benninger, MD, Joel H. Blumin, MD, Gregory Dennis, MD,

Clinical Practice Guideline

Aim: To minimize risk and optimize outcome

Table 1. Topics considered in the scoping phase of guideline development.

Voice Assessment	Laryngeal Examination	Nerve Management	Interventions
• Validated quality of life instrument (VHI) • Auditory perceptual assessment (GRBAS, CAPE-V) • Laryngeal function studies • Pre- and postoperative voice recordings (tape recorder, smartphone recording, laryngeal function study)	• Flexible fiberoptic • Rigid telescopic • High speed exam • Stroboscopy • Indirect mirror exam • Operative (direct) laryngoscopy • Intraoperative EMG • Surface EMG • Needle EMG • Perioperative EMG	• Intraoperative neural monitoring • Surgical techniques for nerve preservation-RLN and external branch of the SLN • Nerve adherence and invasion management • Management of loss of neural signal • Intraoperative repair procedures (techniques for nerve repair; primary anastomosis, grafting) • Management of blunt/ nontransection nerve trauma	• Medical (steroids) • Voice therapy • Primary versus revision surgery (as a modifying factor) • Nerve re-anastomosis • Ansa hypoglossi—RLN reinnervation • Framework laryngoplasty • Injection laryngoplasty • Patient education • Shared decision making

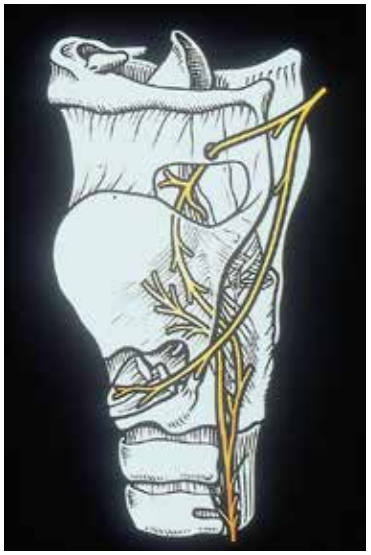
ATA

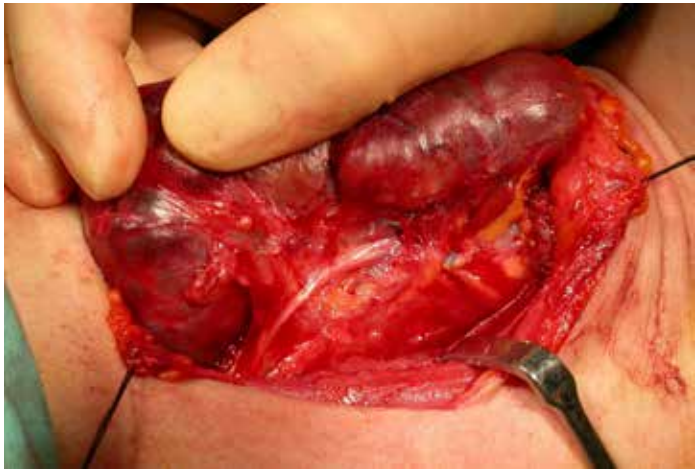
Table 4. Summary of evidence-based statements.

Evidence-Based Statement	Statement strength
Preoperative	
Baseline voice assessment (Statement 1)	Recommendation
Preoperative laryngeal assessment of the impaired voice (Statement 2A)	Recommendation
Preoperative laryngeal assessment of the nonimpaired voice (Statement 2B)	Recommendation
Patient education on voice outcomes (Statement 3)	Recommendation
Communication with anesthesiologist (Statement 4)	Recommendation
Intraoperative	
Identifying recurrent laryngeal nerve (Statement 5)	Strong recommend
Protection of superior laryngeal nerve (Statement 6)	Recommendation
Intraoperative electromyography (EMG) monitoring (Statement 7)	Option
Intraoperative corticosteroids (Statement 8)	No recommendation
Postoperative	
Postoperative voice assessment (Statement 9)	Recommendation
Postoperative laryngeal exam (Statement 10)	Recommendation
Otolaryngology referral (Statement 11)	Recommendation
Voice rehabilitation (Statement 12)	Recommendation

Recurrent Laryngeal Nerve

- The nerve should always be identified
- The identification of the nerve may vary depending on the case
- Beware of individual nerve anatomy especially it's relationship with the Inferior Thyroid artery



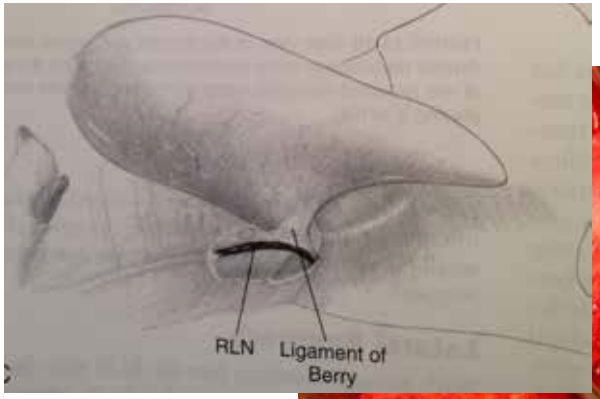


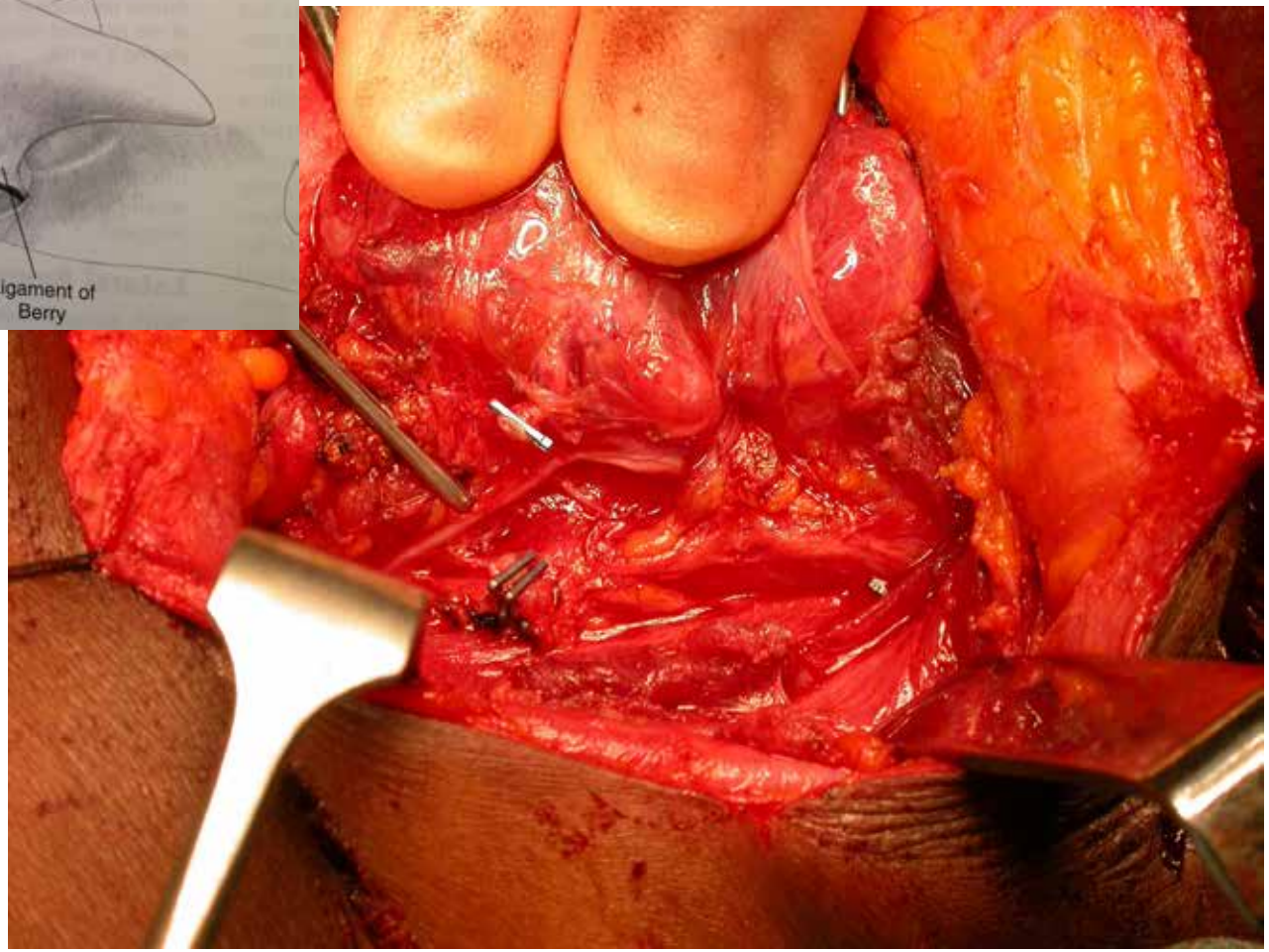
Identification of RLN

Approach	Indications	Advantages	Disadvantages
Lateral Approach	Uncomplicated cases	Protection vascular supply Parathyroid Glands	Not available in cases of large goitres or revision surgery
Inferior Approach	Revision or large goitres	Identifies the nerve in a virgin site	Long segment dissected may lead to neuropraxia
Superior Approach	Revision, large goitres, when considering non-RLN Failure of other approaches	RLN most constant	Ligament of Berry may bleed

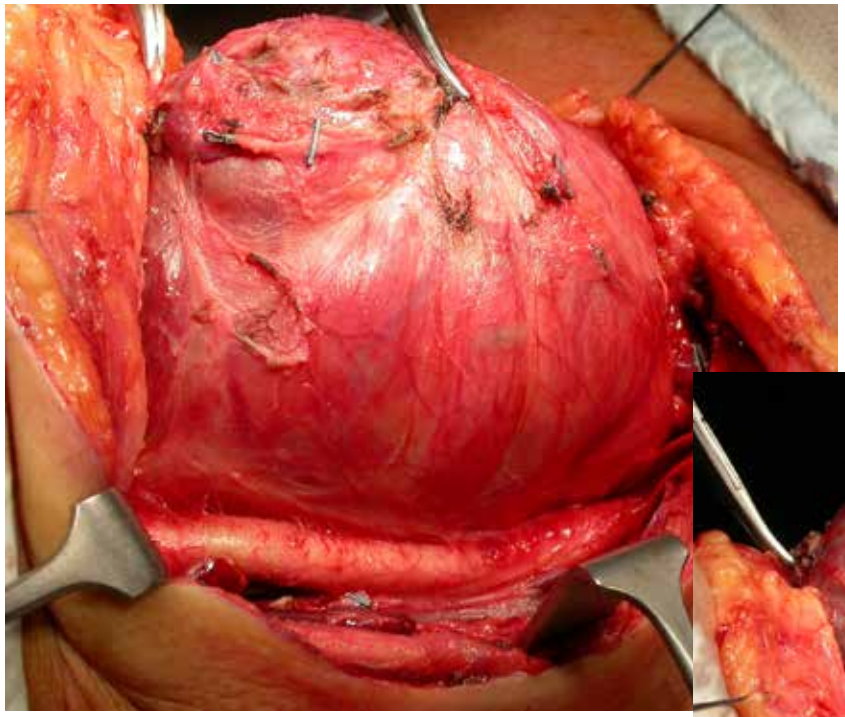
Randolph G et al World J Surg 2004

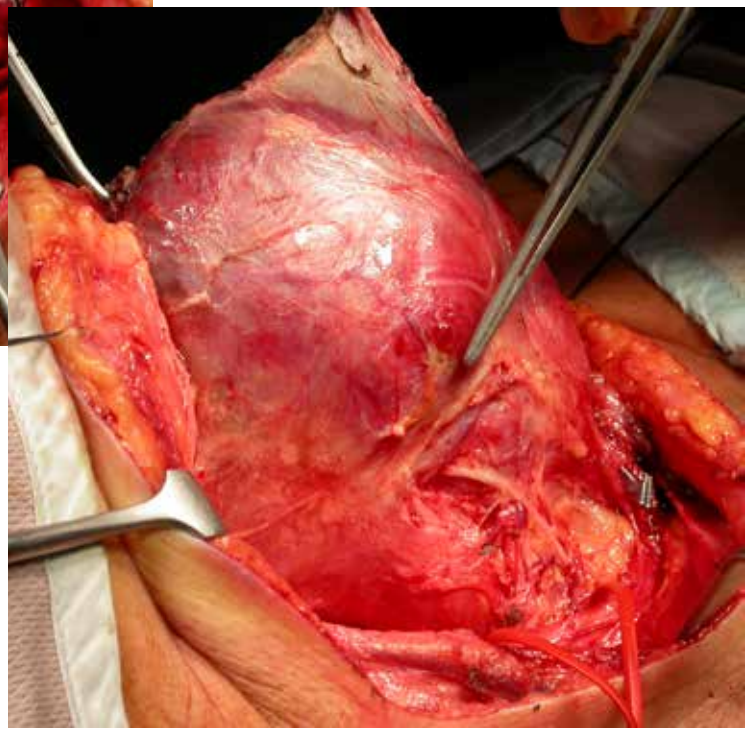
RLN – Lateral Approach



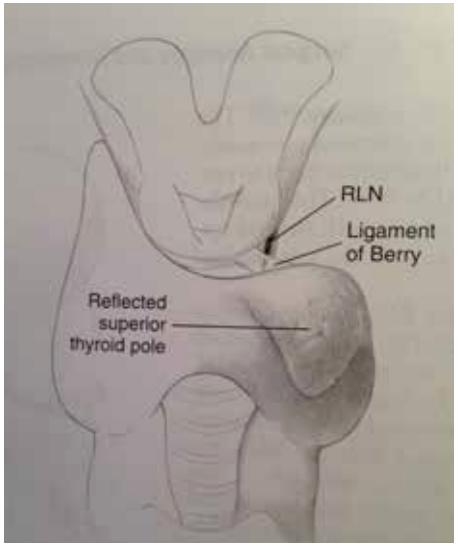


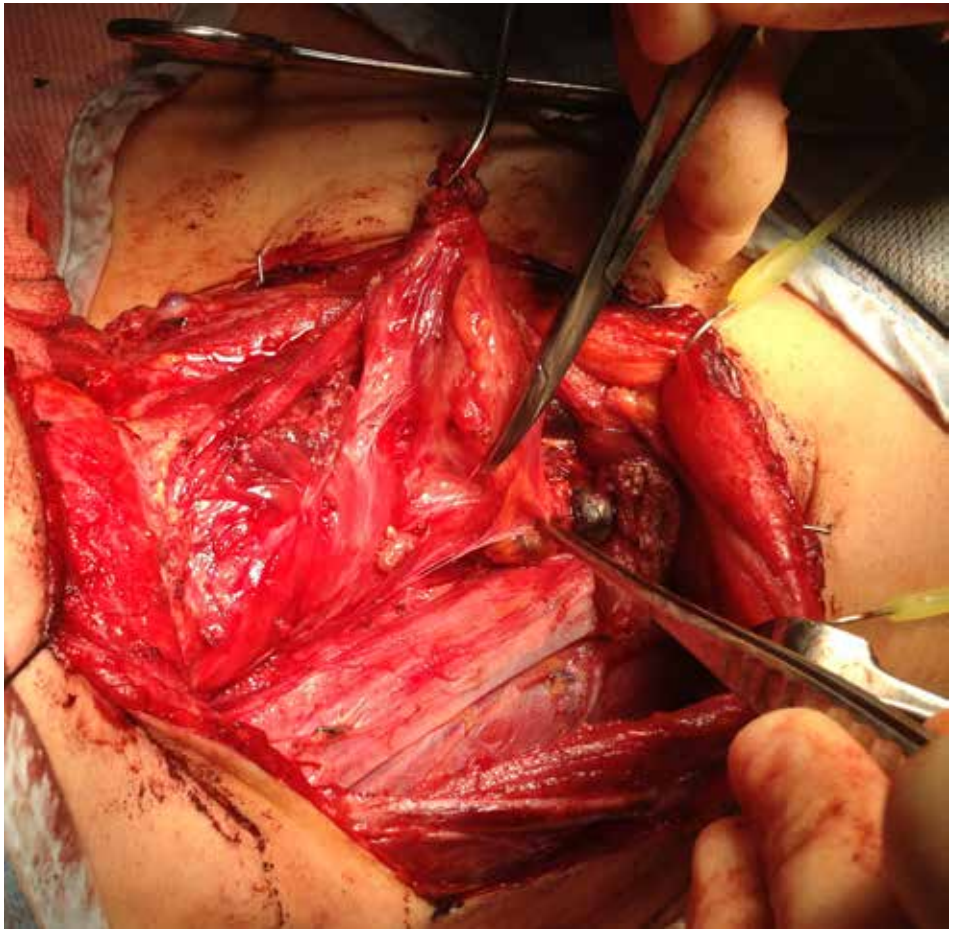
RLN - Inferior Approach

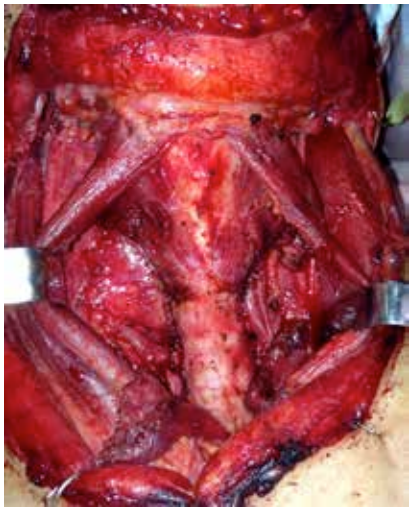




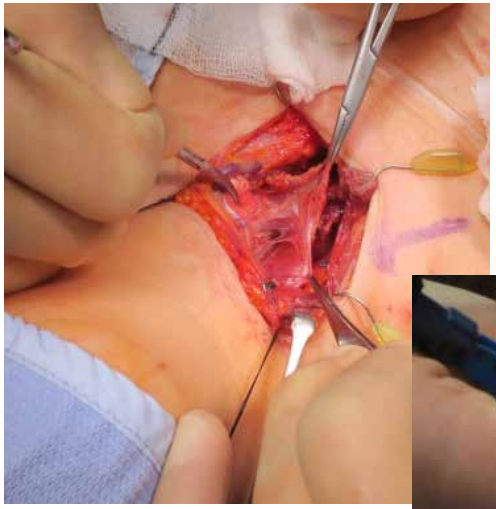
RLN - Superior Approach

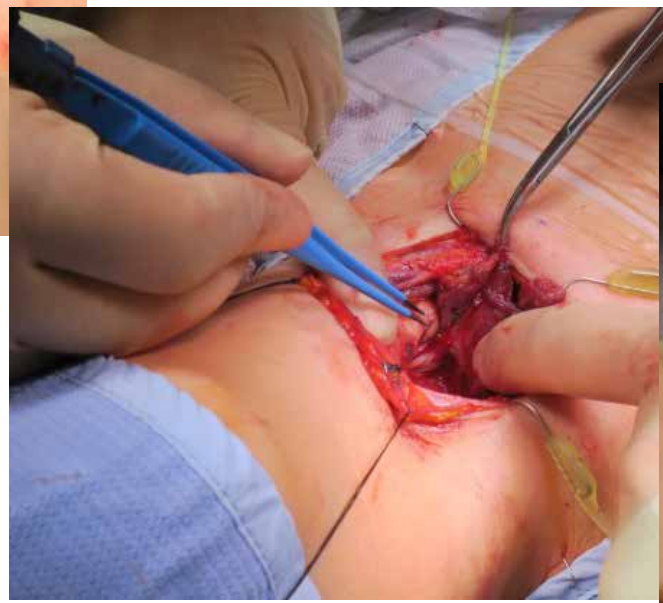






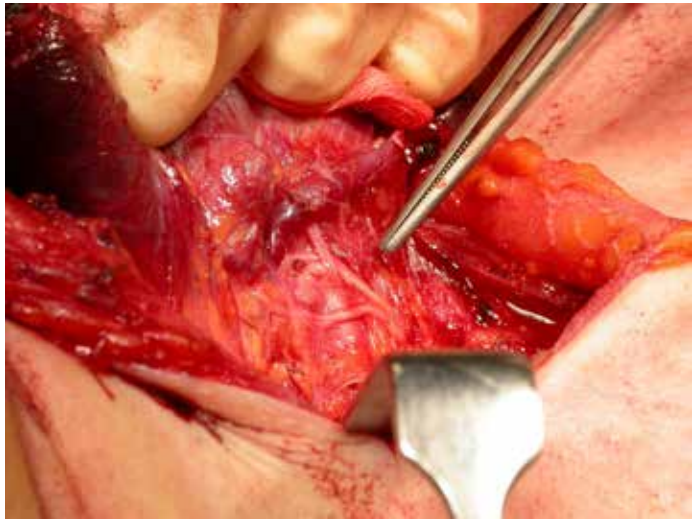
RLN Superior Approach



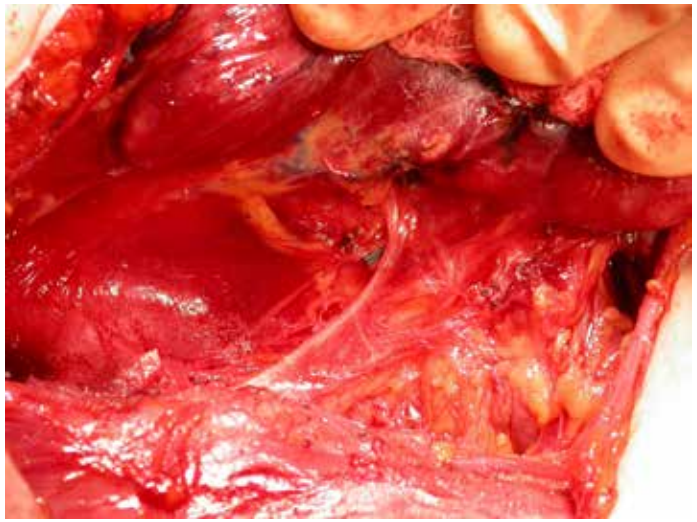


Recurrent Laryngeal Nerve

- Extra-laryngeal branching - 30%



- Non-recurrent laryngeal nerve - 1%

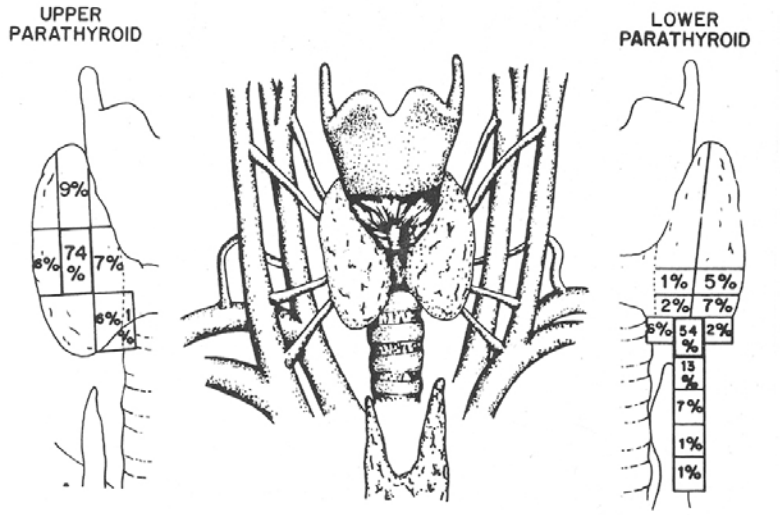


Tip 8

Identify and preserve
the
parathyroid glands – at least 2!

Thyroidectomy – Parathyroid Glands

- The PT glands should be identified whenever possible
- 25 % the PT glands are not in the normal location
- Whenever the vascular supply is lost, do a frozen section and re-implant the gland in the SCM
- Autotransplantation?



Importance of *in situ* preservation of parathyroid glands during total thyroidectomy

L. Lorente-Poch[1,2], J. J. Sancho[1,2], S. Ruiz[1] and A. Sitges-Serra[1,2]

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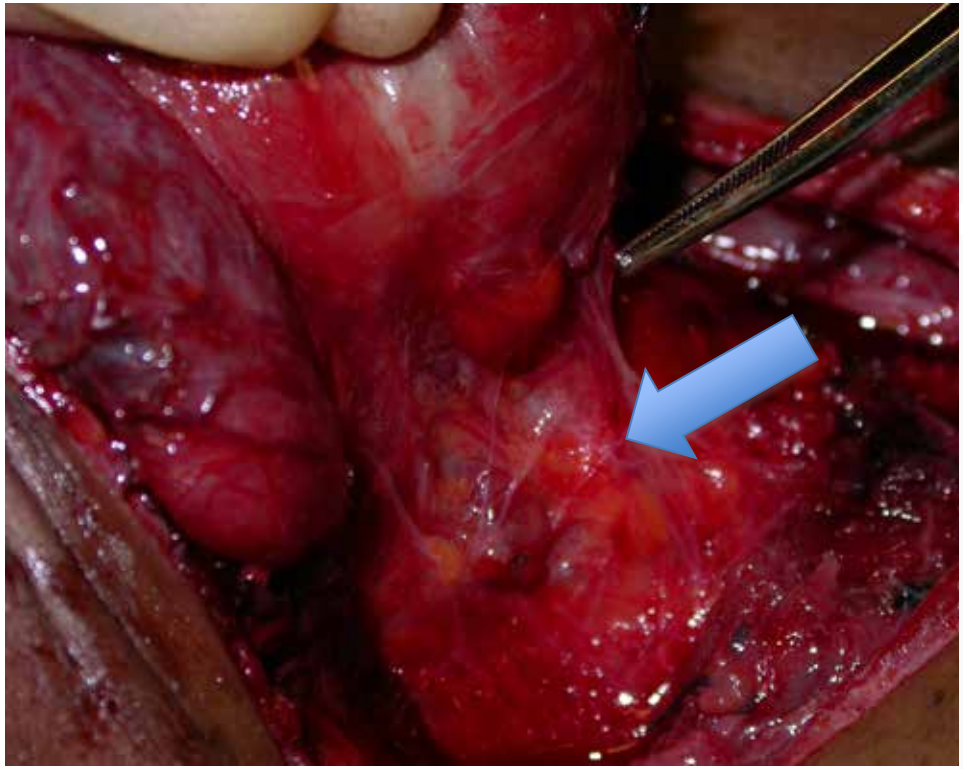
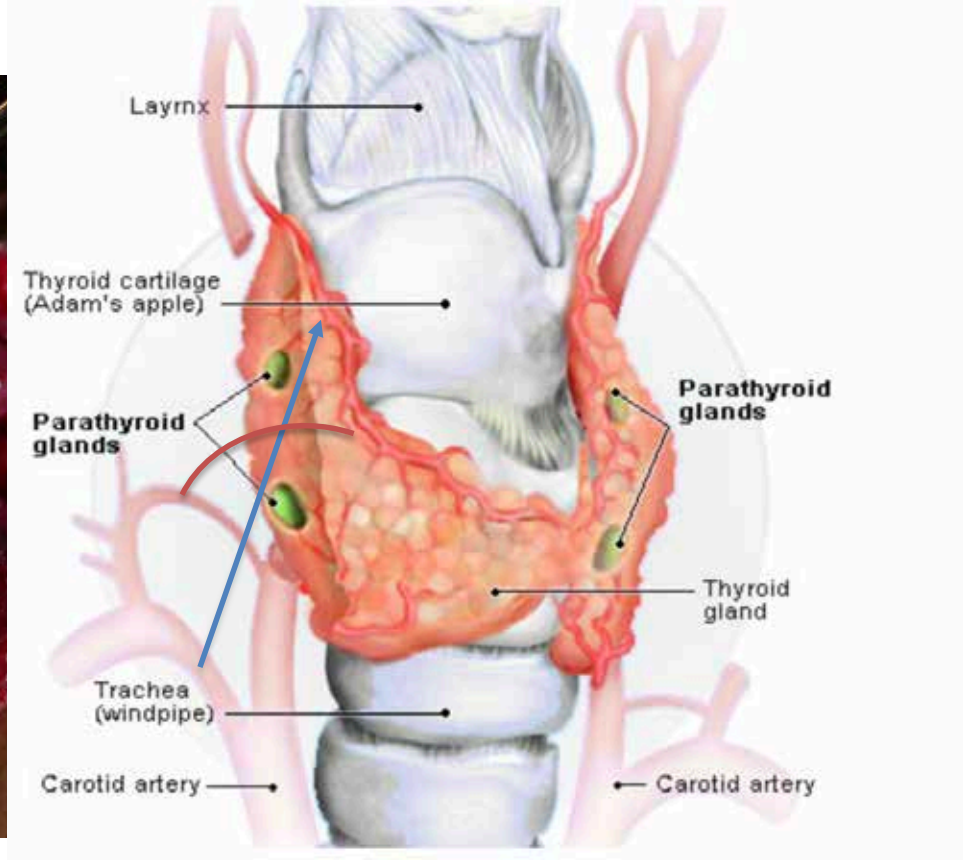
Parathyroid Glands and RLN

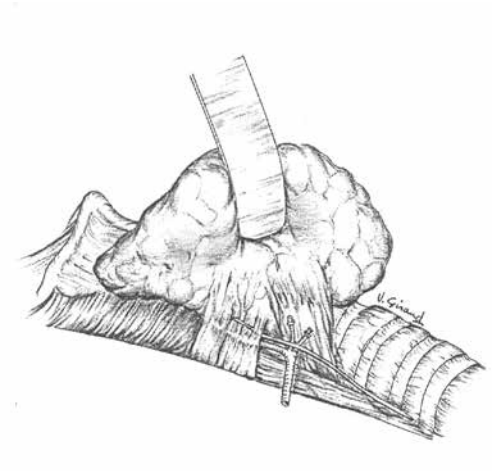


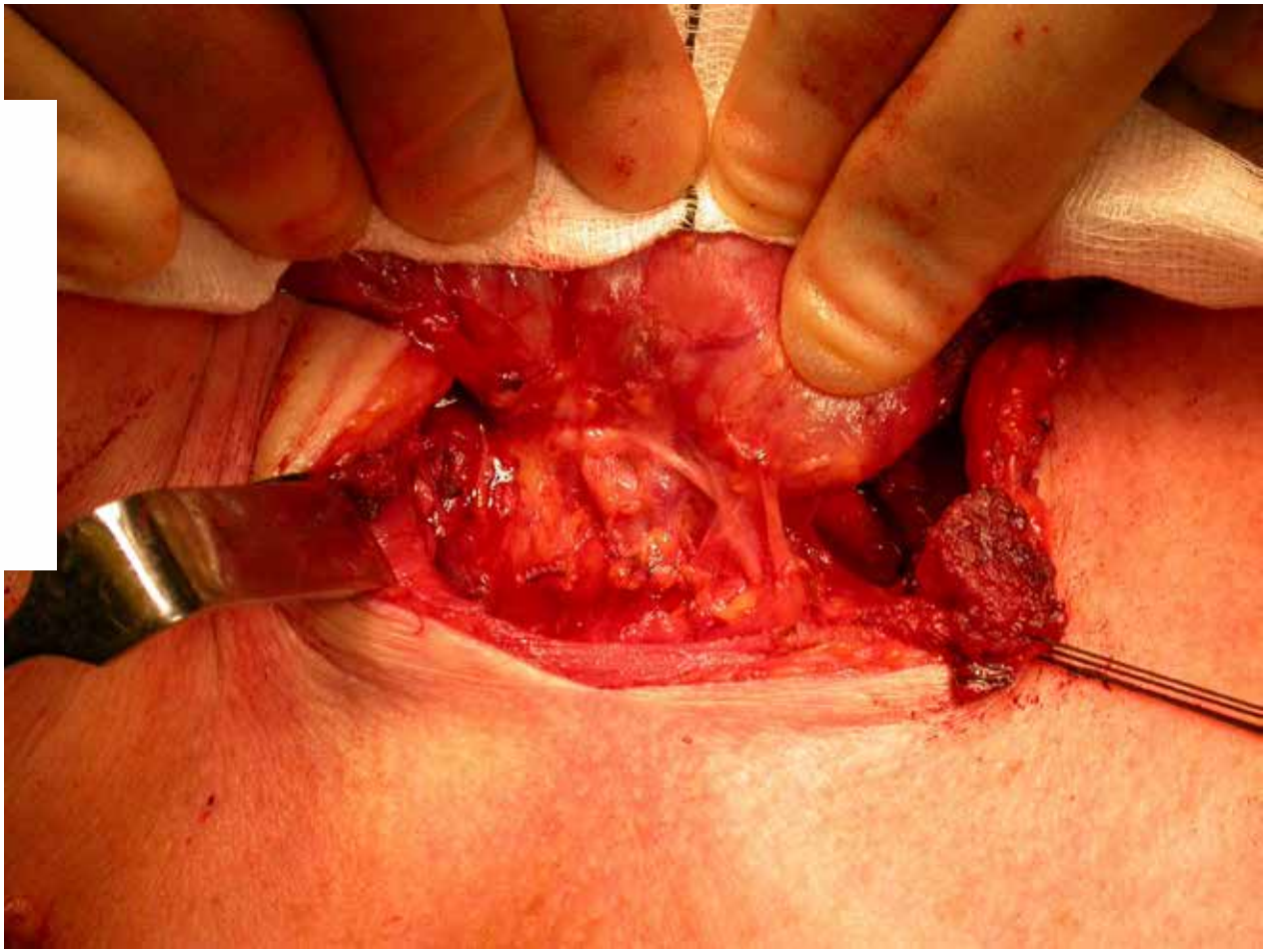


Tip 9

Don’t forget the Berry’s Ligament

Berry's Ligament

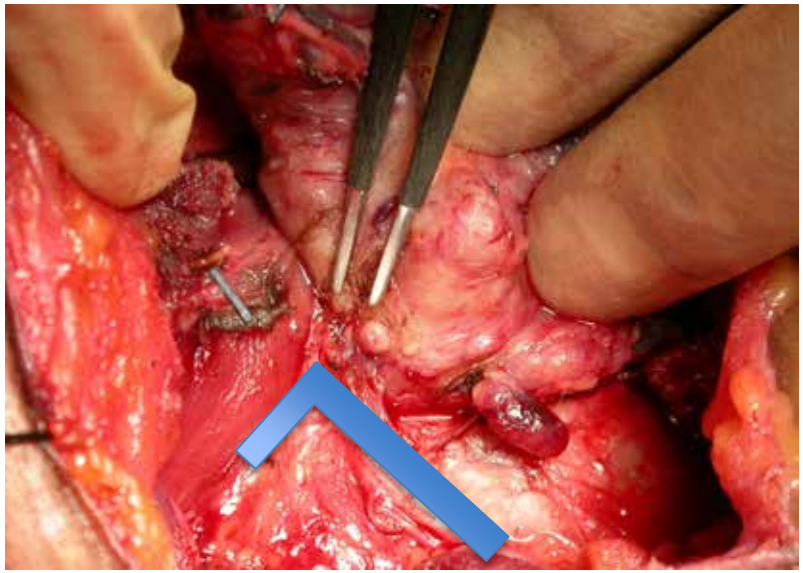




Thyroidectomy

Berry's Ligament

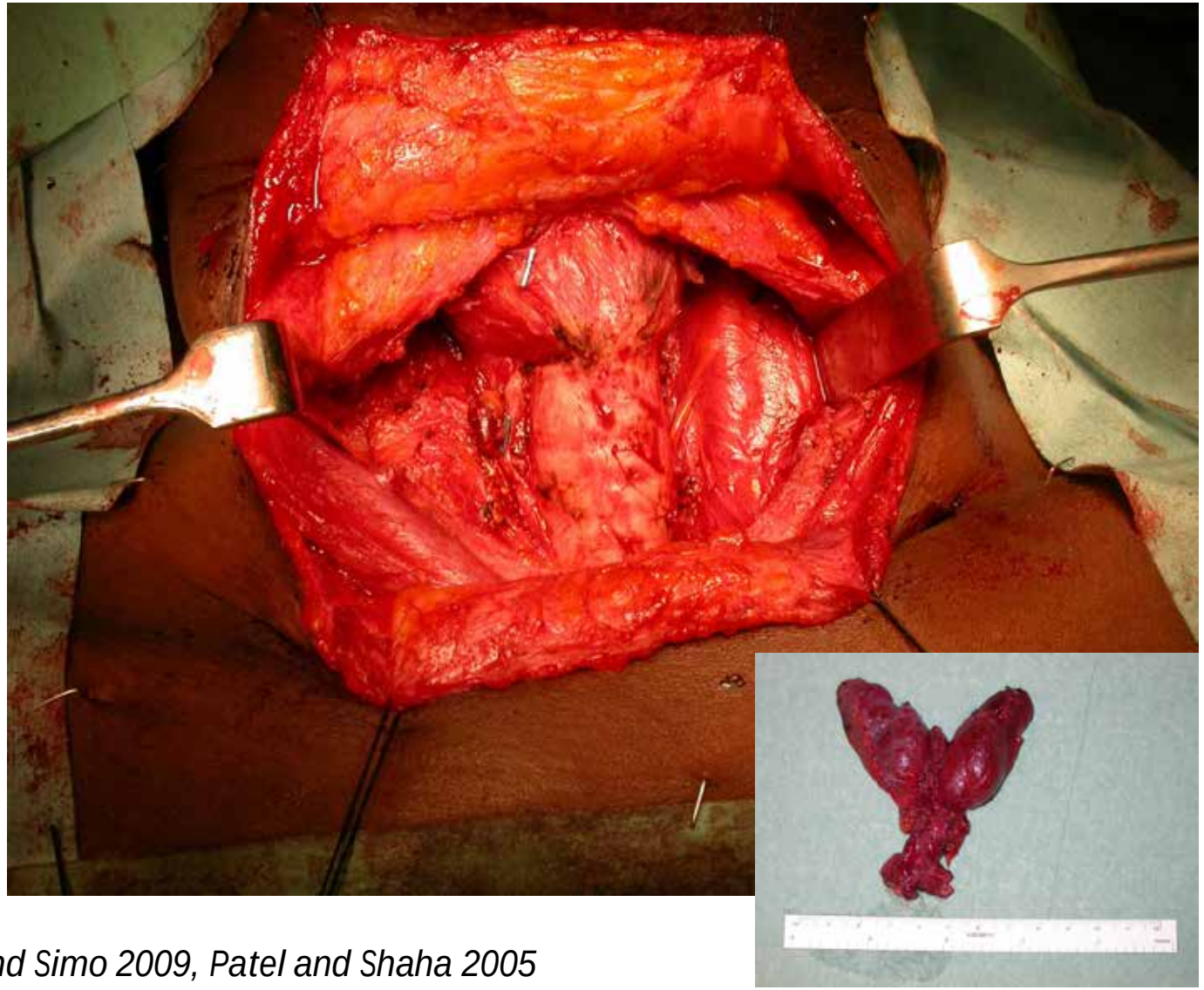
- Very careful dissection
- Bipolar diathermy at low voltage 8 to 10 volts
- Use knife – 15 size blade
- Avoid mass ligations
- You may need to leave a remnant to protect the nerve especially if the crico-tracheal grove is deep.



Tip 10

And finally don’t forget to close properly!

Total Thyroidectomy with CND



Jeannon and Simo 2009, Patel and Shaha 2005

Thyroidectomy

Closure

- Haemostasis (Valsalva)
- Saline wash
- Check RLN and PT glands
- Drain?
- Closure in layers

Summary

- **Thyroidectomy is not an easy operation**
- **Surgeons** should be highly trained and capable to deal with any variations of the disease process and apply adequate surgical procedures.
- **Preoperative planning** should never be understimated
- The technique requires **meticulous attention to detail** and the identification and preservation of RLN, EBSLN and parathyroid glands

Summary

- **Thyroid lobect**omy is the minimum “diagnostic” and therapeutic procedure
- **Total thyroidectomy** is still the definitive procedure for the majority of thyroid disorders and specially cancer.
- Use current technology to aid your surgery
- New minimally invasive techniques should be addressed with caution.