PRESENTING FEATURES

- **PRIMARY**
  - Asymptomatic
  - Solitary nodule
  - Goiter.

- **LOCAL SPREAD:**
  - Hoarseness of voice
  - Dysphasia
  - Dyspnœa
  - Pain ref. to ear: Anaplastic
Pulsatile Scalp Secondaries

- **METASTASIS:**
- Enlarged Cervical L.N.
- Pulsating Scalp Tumour
- Pulsating Bone Tumour
- Pathological Fracture.
SOLITARY THYROID NODULE:

A Goitre, on clinical examination appears to be Single Nodule in Otherwise normal gland

- **Non neoplastic**
  - Dominant nodule of mng
  - Localized Hashimoto’s disease
  - Thyroid cyst.
  - Cystic degeneration of MNG

- **Neo Plastic**
  - Follicular Adenoma
  - Papillary Adenoma
  - Papillary Carcinoma
  - Follicular Carcinoma
  - Medullary Carcinoma
  - Metastatic Carcinoma
  - Intra cystic papillary Carcinoma
  - Cystic degeneration of Adenoma or Carcinoma
INVESTIGATIONS:

1. T.F.T. Euthyroid /Hyperthyroid
2. Anti Thyroid ab. Co existing Thyroiditis
3. X’ray Neck
   - Small grain of sand, Thin strand
   - Circumscribed amorphous calc Benign:
4. Ba. Swallow:
5. X Ray Chest Mediastinal L N
   Secondaries in Lungs
6. Bone X Ray : xray skull
   - OSTEOLYTIC – FOLLICULAR carcinoma
   - OSTEOBLASTIC – MEDULLARY carcinoma
X’ray Chest showing Secondaries in lung
X’ray skull showing Erosion
Xray skull showing metastasis
Tumour Markers:

- **THYROGLOBULIN ASSAY:**
  - Normal: 0 to 20.7 ng/ml
  - Raised in follicular carcinoma
  - Normal levels after surgery
  - Diagnostic for residual tumour and recurrence

- **Calcitonin: Medullary Ca (MCT)**
  - Calcitonin: Basal levels: 1000 pg/ml
  - Extensive MCT: >100,000 pg/ml
  - Helpful to find out recurrence, residual tumour

- C.E.A.(Carcino-embryonic antigen)
ULTRASOUND:

- Is helpful to differentiate Cystic and Solid lesions
- Dominant Nodule with Clinically not palpable multiple nodules
- USG guided FNAC
- In Japan- widely used to diagnose papillary carcinoma.
Thyroid Scan with Radioactive I 131 or Tc 99

- Hyperthyroid with hot overactive nodule:
  - Toxic nodule
  - Toxic adenoma.

- Euthyroid or warm active nodule
  - Functioning adenoma or Toxic adenoma
  - Simple nodule with functioning thyroid tissue
  - Well differentiated Carcinoma.

- Euthyroid with cold inactive nodule.
  - adenoma (non functioning)
  - carcinoma.

10: 20 to 30% of cold nodules are malignant.
40% thyroid malignancies take up I 131

99 MTC (D) : dimercaposuccinic acid
Localized in medullary Ca
Primary, Secondary
Fine needle aspiration cytology

Follicular carcinoma

Papillary carcinoma

Aspiration cytology. Papillary carcinoma with typical cellular characteristics.
Thyroid lymphangiography

- Fine needle aspiration cytology:
Positron Emission Tomography

- Positron emission tomography (PET) is an imaging technology used to assess tissue metabolism.
- The increased metabolic demands of tumors can be visualized through increased uptake of the positron-emitting tracer $^{18}$F-fluorodeoxyglucose (FDG).
- The distribution of FDG helps distinguish benign from malignant tissue.
- Tool for the diagnosis of recurrence in previously treated patients
- Might be of help to differentiate Follicular adenoma from carcinoma
Medullary thyroid carcinoma (MTC).
A 12-year-old boy after four surgical procedures, including two neck dissections for MTC, still had elevated calcitonin serum levels. A somatostatin receptor scintigraphy was negative. FDG-PET scan showed on transaxial (A), coronal (B) and sagittal (C) slices a focus of moderate intensity in the left anterior mediastinum. This lesion was removed surgically and histologically identified as MTC.
Thyroid carcinoma. A 70-year-old man, 4 years after total thyroidectomy and four I131 treatments (total dose of 650 mCi) presented with very high thyroglobulin serum levels and only faint uptake in the right lower neck on the last I131 post-treatment scan. The FDG-PET transaxial (A), coronal (B) and sagittal (C) views clearly demonstrate an intense focus of increased uptake near the medial aspect of the right clavicle.
Recurrent papillary carcinoma of the thyroid gland in a 50-year-old woman 4 years after treatment for differentiated thyroid cancer. FDG-PET coronal slices (*upper row*) show three lesions in the left paratracheal and pericarotid regions (*arrows*), which were histologically proved to be lymph node recurrences after reoperation. The corresponding MR imaging slices (*lower row*) shown for reference give precise localization of these lesions.
de-Groot’s staging

CLINICO PATHOLOGICAL STAGING:

- IB: Bilateral – multifocal " "
- IIA Unilateral significant cervical LN
- II B: Bilateral cervical or mediastinal LN
- III Local invasion cervical (neck) with or without S Pos. LN (LN METS)
- IV: Distant metastases Outside Neck.
TNM Staging:

- **TX:**
  - T1: 1 cm, <1cm, limited to thyroid
  - T2: 1-4 cm, limited to thyroid.
  - T3: >4 cm Limited to thyroid.
  - T4: Any size. extending beyond thyroid.

- **No:** no nodes
- **N1 a:** ipsilateral cervical lymph nodes
- **N1b:** bilateral, midline contra lateral, cervical mediastinal nodes

- **M0** no distant metastasis
- **M1** Distant Metastasis
* Stage Grouping Papillary or Follicular

- Stage I: Any T Any N, M0
- Stage II: Any T Any N1M1
- Stage III:
- Stage IV

<45 years

- Stage I: T1 NoMo
- Stage II: T2 NoMo, T3 NoMo, T4 NoMo
- Stage III: any T N1M0
- Stage IV: any T any N and M1

Stage Grouping Medullary

Stage Grouping Undifferentiated

All cases are Stage IV
**SURGICAL PROCEDURES**

- **Near Total Thyroidectomy**
- **Hartley Dunhill procedure**
  - Papillary Carcinoma
  - High Risk Papillary and Follicular carcinoma
  - Advanced Papillary carcinoma (ET + MET)
  - Follicular Carcinoma (Beir-Walt Re)
  - Medullary Carcinoma
  - Early Resectable Ana plastic.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobectomy</td>
<td>Follicular Carcinoma RAI not available</td>
</tr>
<tr>
<td>Hemithyroidectomy</td>
<td>Minimal Papillary Carcinoma.</td>
</tr>
<tr>
<td></td>
<td>Low Risk Papillary carcinoma.</td>
</tr>
<tr>
<td>Partial Lobectomy</td>
<td>Solitary Nodule</td>
</tr>
<tr>
<td>Subtotal lobectomy</td>
<td>which is benign on FNAC</td>
</tr>
<tr>
<td>Radical Near Total Thyroidectomy</td>
<td>(Extra Cap)</td>
</tr>
</tbody>
</table>

- **Enucleation** to be condemned

- Resection Enucleation
- Partial Lobectomy
- Subtotal lobectomy
- Solitary Nodule

- Radical Near Total Thyroidectomy
SURGICAL PROCEDURES for LN metastasis

- Berry Picking
- Mod. Radical Neck Dissection. Type 3
- Inter jugular LN Dis.
- Mediastanal Dissection
<table>
<thead>
<tr>
<th>Level</th>
<th>Lymph Node Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ia</td>
<td>Submental nodes</td>
</tr>
<tr>
<td>Ib</td>
<td>Submandibular nodes</td>
</tr>
<tr>
<td>IIa</td>
<td>Upper jugular, anterior to IX</td>
</tr>
<tr>
<td>IIb</td>
<td>Upper jugular, posterior to IX (submuscular recess)</td>
</tr>
<tr>
<td>III</td>
<td>Middle jugular nodes</td>
</tr>
<tr>
<td>IVa</td>
<td>Lower jugular nodes (behind clavicular head of sternocleidomastoid muscle)</td>
</tr>
<tr>
<td>IVb</td>
<td>Lower jugular nodes (behind sternal head of sternocleidomastoid muscle)</td>
</tr>
<tr>
<td>Va</td>
<td>Posterior triangle nodes (spinal accessory group)</td>
</tr>
<tr>
<td>Vb</td>
<td>Posterior triangle nodes (transverse cervical artery group, supraclavicular group)</td>
</tr>
<tr>
<td>VI</td>
<td>Anterior (central) compartment lymph nodes (paratracheal, perithyroidal, Delphian)</td>
</tr>
</tbody>
</table>
Modified radical neck dissection

<table>
<thead>
<tr>
<th>Type I (XI preserved)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type II (XI, IJV preserved)</td>
</tr>
<tr>
<td>Type III (XI, IJV, sternocleidomastoid muscle preserved)</td>
</tr>
</tbody>
</table>
## TSH SUPPRESSION THERAPY

Useful in T.S.H. dependant Tumour  
Prevents recurrence.  
Supplemental to other Therapy

### Indications:
- Well-differentiated Ca  
- Well-differentiated Ca and Advanced in Young patients  
- Well-differentiated Ca + Excessive pulmonary Mets  
- (1 131: Pulmonary Fibrosis)  
- Insufficient 1 131 uptake

<table>
<thead>
<tr>
<th>Jesse &amp; Clark : MD And Hosp.</th>
<th>No effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block</td>
<td>No effect</td>
</tr>
<tr>
<td>Cadey: Lahey Clinic</td>
<td>5% improved Survival in Papillary and Follicular</td>
</tr>
</tbody>
</table>
RADIOACTIVE IODINE THERAPY

BEIRWALT REGIME: deGroot’s Regime

- Near total Thyroidectomy
- No (Thyroid + Iodine cont. drug) for one week.
- Post operative $^{131}$I scan
- $^{131}$I 3 to 12 months
- Dose < 30 yr: 500 mc
- Dose > 30 yr: 800 mc

- Autonomous hyper functioning
- Functioning aggressive: Elderly
- Well functioning ) Inoperable Ca
- Well differentiated carcinomas
- Rapidly Progressing Familial Ca.
EXTERNAL IRRADIATION:
Teletherapy or Linear accelerator
Anaplastic Carcinoma
Medullary Carcinoma: Advanced.
Solitary bony Secondaries: pain
Focal type of Lymphoma

CHEMOTHERAPY:
- Doxycycline,
- Methotrexate.
- Actinomycin D,
- CIS-Platinum
- Etoposide.
Papillary Carcinoma

Low Risk Group
- Age M < 40, F < 50
- Tumour size < 5 cm
- No distant mets
- No capsular invasion
- No adhesions invasion

High Risk Group
- Age M > 40, F > 50
- Tumour > 5 cm
- Extrapathyroidal spread
- Metastasis

Surgical Procedures:
- Near Total Thyroidectomy
- Modified Radical Neck Dissection (Inter Jugular Node Dissection)

Therapy:
- RAI Therapy - TSH suppression
FOLLICULAR CARCINOMA

- Unicentric, blood spread,
- High iodine uptake,
- TSH NonDependant

Local Tumour: Hemithyroidectomy
Metastatic Ca: Near Total Thyroidectomy without I 131 Therapy
If facility is available: Beirwalt Regime for both

High Risk Group
- Old pts
- Gross capsular invasion
- Vascular invasion
- Metastatic disease
- Solid cluster of tumour cells (Insular CA)

Low Risk Group
- Young patients
- Minimal vascular invasion
- Localised disease

Beirwalt Regime
Thyroglobulin monitoring

Hemithyroidectomy
SERUM THYROGLOBULIN: PROGNOSTIC INDEX

- Initial high levels: >500 ng/ml
  - Metastasis
- Initial low levels: <100 mg/ml
  - LOCALISED
- Level becoming <5 ng/ml after operation/I 131
  - If no residual tumour
- Recurrence is followed by raised levels.
MEDULLARY CARCINOMA

TSH non-respondent  Do not conc. iodine
Relatively insensitive to External Radiation.
Frequently multi centric Surgery only choice

Localized Disease: Near Total Thyroid
LN enlarged:  Inter jugular RND

Advanced Disease:  1) Debulking (Hormone source removed)
2) Combination Chemo Therapy
   Doxycycline with Streptozotocin

Investigations: For Men Type II/A and B
- Appropriate management
  - Phaeochromocytoma: First
  - Thyroid: Next
  - Parathyroid: Last

Monitoring with Serum Calcitonin
Total thyroidectomy and central compartment dissection is the current standard treatment for medullary thyroid cancer.
Level VI and thyroid compartment dissection. Meticulous dissection of the central compartment removing all lymph node bearing tissues while preserving the recurrent laryngeal nerve is performed.
Intraoperative identification of the left superior parathyroid gland (arrow). It is possible to identify the parathyroid glands visually by anticipating their anatomical location, shape, and color. Every attempt is made to identify the parathyroid glands. In instances of devascularization, pathologic confirmation and autotransplantation is performed.
Modified neck dissection of Levels II through V with preservation of the internal jugular vein (JV), spinal accessory nerve (CNXI), sternomastoid muscle (SCM), and vagus nerve.
Anaplastic Carcinoma

CONTROL OF LOCAL DISEASE:
Preservation of airways
Surgical Resection
External Irradiation
Combination chemotherapy Doxycycin, Methotrexate, Actinomycin D, Cis-Platinum, Etoposide.

Above Combination chemotherapy
- Mean Survival 175 days
  - Survival Rate 6 months: 50%
  - 1 year 35%
  - 5 years 17%
- Other Series 30 to 40% Remission
- If yes Survival benefit
### PROGNOSTIC INDEX

#### DNA ploidy:
- Aneuploidy aggressive
- 25% Lethal

#### AGES Scale: MAYO CLINIC

<table>
<thead>
<tr>
<th>Factor</th>
<th>Low risk</th>
<th>High risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>86%</td>
<td>14%</td>
</tr>
<tr>
<td>Grade path</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extent of disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of Tumour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>metastasis, extrathyroidal</td>
<td>2%</td>
<td>46%</td>
</tr>
<tr>
<td>Undifferentiated</td>
<td>MORTALITY</td>
<td>MORTALITY</td>
</tr>
</tbody>
</table>

#### University of Chicago criteria
- Operative findings
- Total Body I 131 scan within six months.

#### AMES SCALE: LAHEY CLINIC

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Metastasis</td>
<td></td>
</tr>
<tr>
<td>Extent of local disease</td>
<td></td>
</tr>
<tr>
<td>Size of Tumour</td>
<td></td>
</tr>
</tbody>
</table>

#### MACIS
- Metastases, Age, Completeness of surgery, Invasion of extrathyroidal tissue, Size)
## Histology of Thyroid tumours and Survival

<table>
<thead>
<tr>
<th>Tumour Type</th>
<th>Invasion Pattern</th>
<th>20 yrs Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaplastic</td>
<td>Localised/Generalised</td>
<td>in months</td>
</tr>
<tr>
<td>Papillary</td>
<td>Capsulated</td>
<td>90%</td>
</tr>
<tr>
<td></td>
<td>Poor Capsulation</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Extra Thyroidal</td>
<td></td>
</tr>
<tr>
<td>Follicular</td>
<td>Minimum Capsular</td>
<td>80%</td>
</tr>
<tr>
<td></td>
<td>Invasion/vascular Invasion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gross Invasion</td>
<td>20%</td>
</tr>
<tr>
<td>Medullary</td>
<td>Confined to Gland</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Stage II and stage III</td>
<td>10%</td>
</tr>
</tbody>
</table>
Shortcut to Thyroid for oncologist.Ink