Pre-operative Ultrasound of Lymph Nodes in Thyroid Cancer

AACE - Advances in Medical and Surgical Management of Thyroid Cancer - 2018

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No disclosures
ATA Risk of Recurrence - Stratification Based on Initial Staging - 2009

- **LOW RISK**
  - Classic PTC / WDTC
  - Complete resection
  - No Extra-thyroidal extension.
  - No vascular invasion

- **INTERMEDIATE RISK**
  - Microscopic Extra-thyroidal extension
  - Cervical Lymph node Mets
  - Aggressive Histology
  - Vascular invasion

- **HIGH RISK**
  - Macroscopic gross Extra-thyroidal extension
  - Incomplete tumor resection
  - Thyroglobulin elevation
  - Distant Mets
Figure 4

Risk of Structural Disease Recurrence
(In patients without structurally identifiable disease after initial therapy)

High Risk
Gross extrathyroidal extension, incompletely tumor resection, distant metastases, or lymph node >3 cm

Intermediate Risk
Aggressive histology, minor extrathyroidal extension, vascular invasion, or >5 involved lymph nodes (0.2-3 cm)

Low Risk
Intrathyroidal DTC, ≤5 LN micrometastases (<0.2 cm)

- FTC, extensive vascular invasion (~30-55%)
- pT4a gross ETE (~30-40%)
- pN1 with extranodal extension, >3 LN involved (~40%)
- PTC, >1 cm, TERT mutated ± BRAF mutated* (~40%)
- pN1, any LN >3 cm (~30%)
- PTC, extrathyroidal, BRAF mutated* (~10-40%)
- PTC, vascular invasion (~15-30%)
- Clinical N1 (~20%)
- pN1, >5 LN involved (~20%)
- Intrathyroidal PTC, ≤4 cm, BRAF mutated* (~10%)
- pT3 minor ETE (~3-8%)
- pN1, all LN <0.2 cm (~5%)
- pN1, ≤5 LN involved (~5%)
- Intrathyroidal PTC, 2-4 cm (~5%)
- Multifocal PMC (~4-6%)
- pN1 without extranodal extension, ≤3 LN involved (~2%)
- Minimally invasive FTC (~2-3%)
- Intrathyroidal, <4 cm, BRAF wild type* (~1-2%)
- Intrathyroidal unifocal PMC, BRAF mutated*, (~1-2%)
- Intrathyroidal, encapsulated, FV-PTC (~1-2%)
- Unifocal PMC (~1-2%)
RECOMMENDATION 6

Thyroid sonography with survey of the cervical lymph nodes should be performed in all patients with known or suspected thyroid nodules. (Strong recommendation, High-quality evidence)

Sonographic evaluation of the anterior cervical lymph node compartments (central and lateral) should be performed whenever thyroid nodules are detected. If ultrasound detects cervical lymph nodes that are sonographically suspicious for thyroid cancer (Table 8), FNA of the suspicious lymph node should be performed for cytology and washout for thyroglobulin measurement if indicated. In addition, this scenario also warrants US-guided FNA of a subcentimeter nodule that is likely to represent the primary tumor based upon sonographic features.
RECOMMENDATION 32

A) Preoperative neck US for cervical (central and especially lateral neck compartments) lymph nodes is recommended for all patients undergoing thyroidectomy for malignant or suspicious for malignancy cytologic or molecular findings. (Strong recommendation, Moderate-quality evidence)

B) US-guided FNA of sonographically suspicious lymph nodes > 8-10 mm in the smallest diameter should be performed to confirm malignancy if this would change management. (Strong recommendation, Moderate-quality evidence)

C) The addition of FNA-Tg washout in the evaluation of suspicious cervical lymph nodes is appropriate in select patients, but interpretation may be difficult in patients with an intact thyroid gland. (Weak recommendation, Low-quality evidence)
Characteristics of Benign Lymph Nodes

- Flattened or oval shape
  - Short / long axis < 0.5
- Echogenic (hilar) line
- Vascular flow limited to hilum on Doppler
- Size *varies* with compartment and *is less important* than morphology.
- Border characteristics are also less important.
The Hilar Line

- A normal node can be split down the central hilum.
- Hilum contains fat and vessels
- A normal hilar line can be thin or thick, and can be central or eccentric/diagonal.
- The presence of a hilar line is reassuring, but its absence is not considered suspicious.
Characteristics of Metastatic Lymph Nodes

- Calcifications
- Cystic necrosis
- Chaotic (peripheral) vascularization
- Rounded appearance
  - Short/Long Axis > 0.5
- Jugular displacement
- Absent echogenic (hilar) line
Disordered (peripheral) vascularity
Size > 3cm is associated with high risk of Recurrent disease
Table 8: Ultrasound features of lymph nodes predictive of malignant involvement. (adapted with permission from the European Thyroid Association guidelines for cervical ultrasound (20)

<table>
<thead>
<tr>
<th>Sign</th>
<th>Reported sensitivity %</th>
<th>Reported specificity %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcalcifications</td>
<td>5-69</td>
<td>93-100</td>
</tr>
<tr>
<td>Cystic aspect</td>
<td>10-34</td>
<td>91-100</td>
</tr>
<tr>
<td>Peripheral vascularity</td>
<td>40-86</td>
<td>57-93</td>
</tr>
<tr>
<td>Hyperechogenicity</td>
<td>30-87</td>
<td>43-95</td>
</tr>
<tr>
<td>Round shape</td>
<td>37</td>
<td>70</td>
</tr>
</tbody>
</table>
A correlation performed between US findings and pathology at surgery (292) has shown for lymph nodes > 7 mm in the smallest diameter, that a cystic appearance or hyperechoic punctuations in a context of thyroid cancer should be considered as malignant; lymph nodes with a hyperechoic hilum are reassuring; the type of vascularization (central: reassuring; peripheral: concerning) has a high sensitivity/ specificity; a round shape, a hypoechoic appearance or the loss of the hyperechoic hilum by themselves does not justify a FNAB.

Interpretation of neck US should take into account all other clinical and biological data.
ATA 2015 Guidelines
PRE-OP Lymph Nodes for Biopsy

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Should this solitary <0.7 cm metastatic node undergo biopsy prior to thyroidectomy?
Should this solitary 0.6 cm atypical node undergo biopsy prior to thyroidectomy?
Prognostic Indicators for Recurrence
Nodal factors

- Lymph node metastases larger than 3 cm
- Extra-nodal extension
- More than 5 lymph nodes involved
- Aggressive Subtype (Tall Cell, TERT)
- High ratio of positive/removed nodes
Comprehensive pre-operative cervical ultrasound includes the central compartment (VI)
Comprehensive pre-operative cervical ultrasound includes the central compartment (VI)
The pre-operative neck US assesses more than just cervical lymph nodes.

- Evaluate the thyroid for signs indicative of high risk of aggressive disease
  - Size of index thyroid lesion.
  - Multifocality.
  - Suspicion of extrathyroidal extension.
- Location of cancer
  - Adjacent to trachea or RLN
  - Isthmus lesions have higher rate of ETE
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Preoperative Factors Associated with High Risk of Recurrence

- Lesion factors
  - Extrathyroidal Extension (ETE)
  - Location (Adjacent to RLN or trachea)
  - Nodes - Number and size (ENE)
- Signs or symptoms of invasion of RLN or trachea
- FNAB findings of high grade malignancy
- Patient factors
  - Familial cancer, radiation
Extrathyroidal Extension into Strap Muscles
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Suspicious for Extrathyroidal Extension
Extensive abutment of thyroid capsule is a high risk for ETE

Summary

- Preoperative comprehensive cervical ultrasound is essential in all patients undergoing surgery for thyroid cancer.
- Examination allows risk stratification to aid in planning extent of thyroid surgery.
- Tumor factors:
  - size
  - location
  - abutment ratio
- Extrathyroidal extension (ETE)
- Central and lateral lymph nodes
- Prepare pre-operative map.