Head and Neck Ultrasound Image Interpretation

Post Graduate Thyroid and Parathyroid Ultrasound Course
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Normal Head & Neck Ultrasound Anatomy

Head & Neck Anatomy

- Thyroid
- Trachea
- Esophagus

Diagram showing anatomical structures of the head and neck region.
Normal phonation

Normal Swallow

Ultrasound Interpretation

Thyroid
Normal Thyroid

Hashimoto's thyroiditis

Benign Thyroid Nodules

Cystic degeneration

Colloid Nodules

Graves disease
Colloid Nodules

- Comet tail echoes
- "spongiform"

Benign Thyroid Nodule (BTN)

- Coarse calcification
- Thyroid hemorrhagic nodule
- Thyroid insufficiency, findings

TIS<0.4 MI=1.4 AC=100%
Ultrasound Characteristics
Benign v. Malignant Thyroid Nodules

**Benign**
- Isoechoic/hyperechoic
- (Coarse calcifications)
- Thin, well-defined halo
- Regular margin
- Hypovascular
- No lymphadenopathy

**Malignant**
- Hypoechoic
- Microcalcifications
- Thick or absent halo
- Irregular margin
- Increased vascularity
- Lymphadenopathy

**Benign Thyroid Nodule**
Homogeneous, peripheral blood flow, well-defined

**Papillary Carcinoma**
Cystic Papillary Carcinoma

Nonpalpable PTC primary tumor

Metastatic Papillary CA

Follicular Adenoma

Follicular Carcinoma
Ultrasound Interpretation

Parathyroid

Tc 99m Sestamibi
Why Parathyroid Ultrasound?

- localize SITE as well as SIDE
- 3D view and relation to other structures
- suspect intrathyroidal adenoma
- unexpected thyroid pathology which can be addressed at time of parathyroid exploration
- US-guided FNA and PTH assay
- US and Sestamibi are complementary (thyroid nodules, mediastinal/retroesophageal parathyroids)
MNG and parathyroid adenoma

large inferior parathyroid adenoma

large inferior parathyroid adenoma

secondary hyperparathyroidism
Ultrasound Interpretation
Lymph Nodes

**Ultrasound Characteristics**
**Benign v. Malignant Lymph Nodes**

<table>
<thead>
<tr>
<th>Benign</th>
<th>Malignant</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Oval</td>
<td>• Round</td>
</tr>
<tr>
<td>• Small</td>
<td>• Large</td>
</tr>
<tr>
<td>• Hilum visible</td>
<td>• Hilum not visible</td>
</tr>
<tr>
<td>• Isoechoic/hyperechoic</td>
<td>• Hypoechoic/heterogeneous</td>
</tr>
<tr>
<td>• No calcifications</td>
<td>• Microcalcifications</td>
</tr>
<tr>
<td>• Regular margin</td>
<td>• Irregular margin</td>
</tr>
<tr>
<td>• Hilar vascular pattern</td>
<td>• Disordered vascular pattern</td>
</tr>
<tr>
<td>• Single</td>
<td>• Multiple</td>
</tr>
<tr>
<td>• Distinct from surrounds</td>
<td>• Invasion of surrounds</td>
</tr>
</tbody>
</table>

ultraltrasound images of lymph nodes showing benign and malignant characteristics.
1. Size

Figure 4.16 – Lymph node size as an indicator of malignancy.

2. Shape

Figure 4.17 – Lymph node shape as an indicator of malignancy.
3. Echogenic hilus

Figure 4.19 – Echogenic hilus as a criterion of malignancy
4. Echogenicity

![Echogenicity Image]

*Figure 4.23 – Echogenicity as a criterion of malignancy.*

5. Necrosis

![Necrosis Image]

*Figure 4.25 – Necrosis as a criterion of malignancy.*
6. Extracapsular spread

Figure 4.28 – Extracapsular spread as a criterion of malignancy.

7. Colour flow

Figure 4.31 – Colour flow (vascular pattern) as a criterion of malignancy.
Hilar blood flow (video)

Benign lymph node

Malignant Lymphoma

metastatic ssc
8. Number

Figure 4.34 – Number of nodes as a criterion of malignancy.
9. Calcification

Figure 4.35 – Calcification as a criterion of malignancy.
Rule out carotid invasion

Regional Designation of Node Distribution

Ultrasound
Parotid/Salivary gland

pleomorphic adenoma of parotid
Alcohol sclerotherapy of Parotid Lymphoepithelial Cyst

Tubular structure

Doppler
Lymphangioma

T2W

tongue base carcinoma
Supraglottic carcinoma
sebaceous cyst

Neck Zone2 Right Long

schwannoma sympathetic chain
Branchial Cleft Cyst

Abscessed Lymph Node

Paraganglioma
Ultrasound-guided Procedures

Fine Needle Aspiration
Needle Entry at Mid-point of Transducer and 3-4 mm from Edge
Angle of Needle-to-transducer Depends on Depth of Target Lesion

Intraoperative Ultrasound