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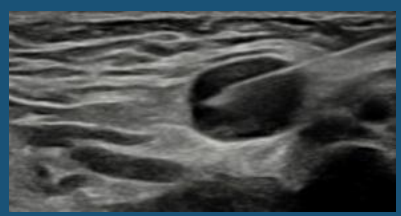

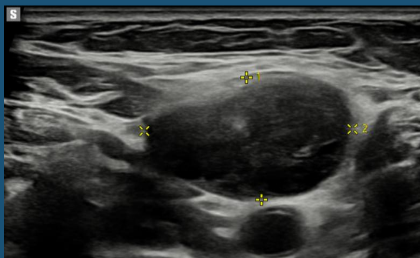

Varying Nodal Appearances

Head & Neck Ultrasound Study Day

Presented by: Roma Dave
Specialist Head & Neck Sonographer, HCPC Registered
PGCert, PGDip Ultrasound | PGD Head & Neck US with FNAC

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By the end of this session you will be able to:

- Describe the sonographic features of a normal lymph node
- Recognise the spectrum of reactive nodal change
- Identify features that raise suspicion of malignancy
- Differentiate between common nodal pathologies
- Understand the role of Doppler in nodal assessment
- Know when to refer or recommend intervention

Why Ultrasound? Identifying Nodal Metastases

Modality	Accuracy
Palpation	59%
CT	66%
MRI	75%
Ultrasound	68%
Ultrasound + FNAC	86%

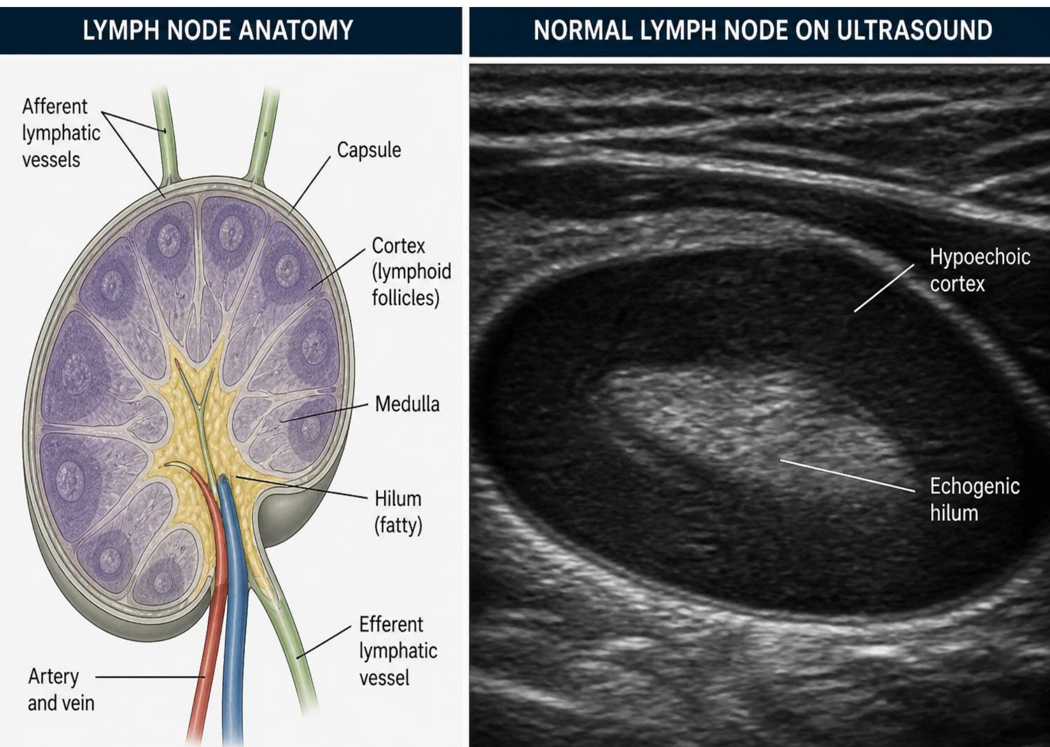
Ultrasound-guided FNAC remains one of the most accurate non-surgical methods for nodal staging.

Anatomy of a Lymph Node

Why This Matters Sonographically

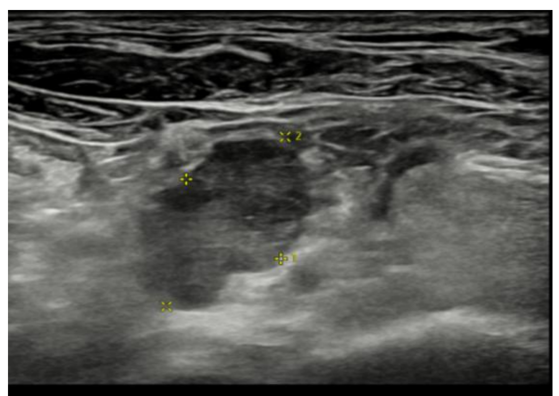
Cortex = hypoechoic outer component
Hilum = echogenic central reflector
Vessels enter via the hilum
Early disease usually begins in the cortex

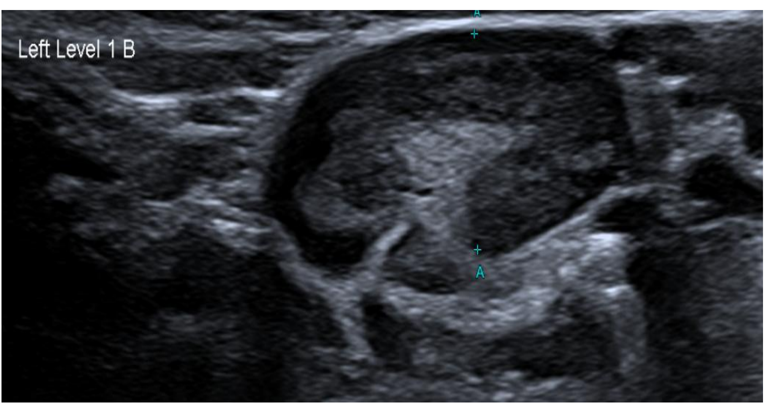
Key Concept
Cortex and hilum are reciprocal.
As the cortex widens → the hilum narrows



Systematic Assessment — Size

Always assess:
Size
Shape
Cortex
Hilum
Margins
Echogenicity
Necrosis
Doppler pattern



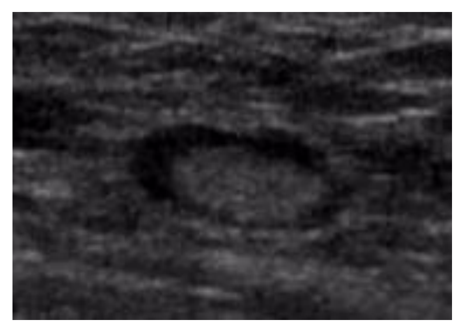


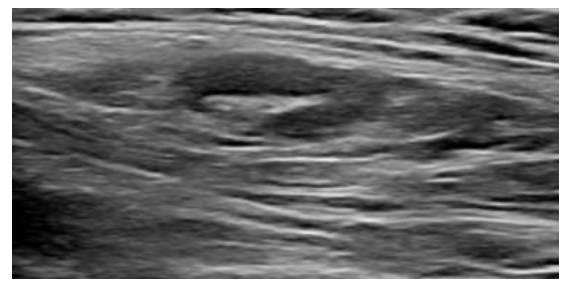
Don’t rely on one feature, recognise the overall pattern.

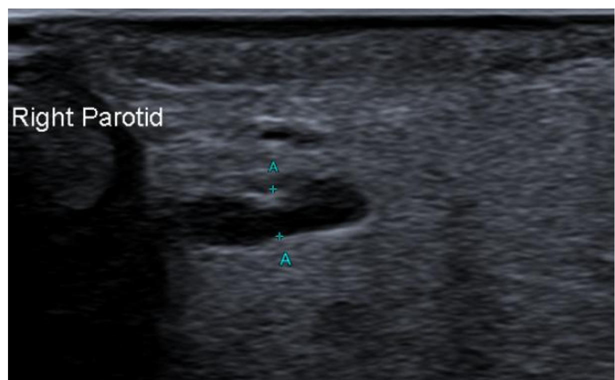
Normal Lymph Node — Sonographic Features

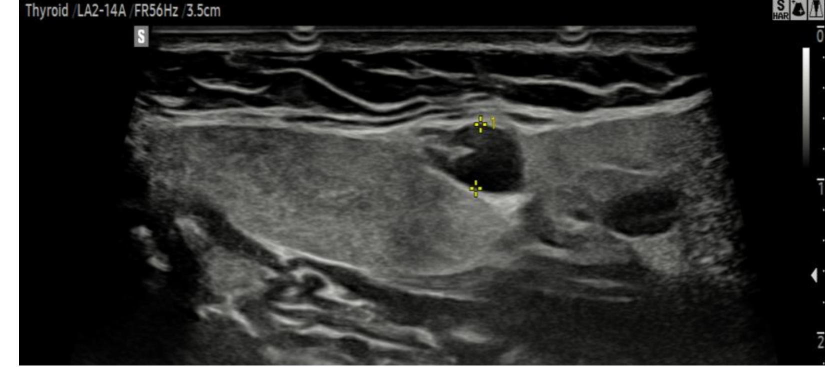
Key Features of a Normal Node

- Oval/elliptical shape
- Echogenic fatty hilum
- Hypoechoic cortex - uniform & thin
- Hilar vascularity on Doppler
- Short axis < 1cm (level dependent)









Reactive Lymphadenopathy

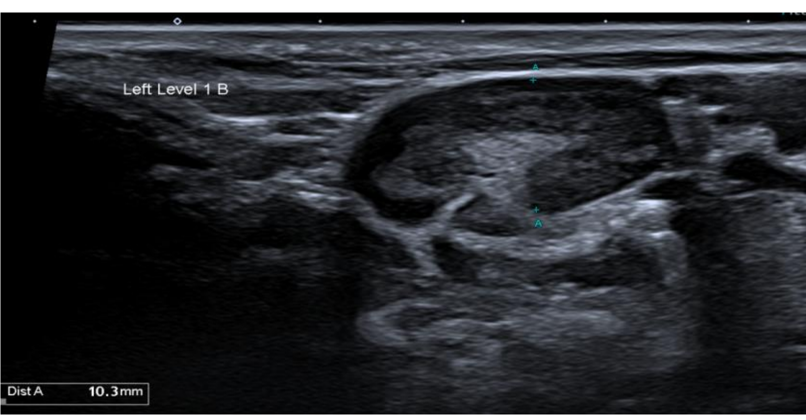
⚠ Reactive change typically preserves nodal architecture.

What causes reactive change?

Infection (viral, bacterial)
Inflammatory conditions
Post-vaccination response

Sonographic Features

Preserved oval morphology
Diffuse cortical thickening
Maintained hilum
Increased hilar flow
Tender on probe pressure



Clinical history is essential - reactive nodal appearances may overlap with malignant morphology, particularly following recent vaccination or infection.

Reactive change tends to preserve nodal architecture.

Dave R et al. *Supraclavicular lymphadenopathy following COVID-19 vaccination*. 2021.

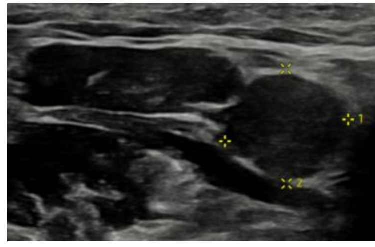
Systematic Assessment - Shape

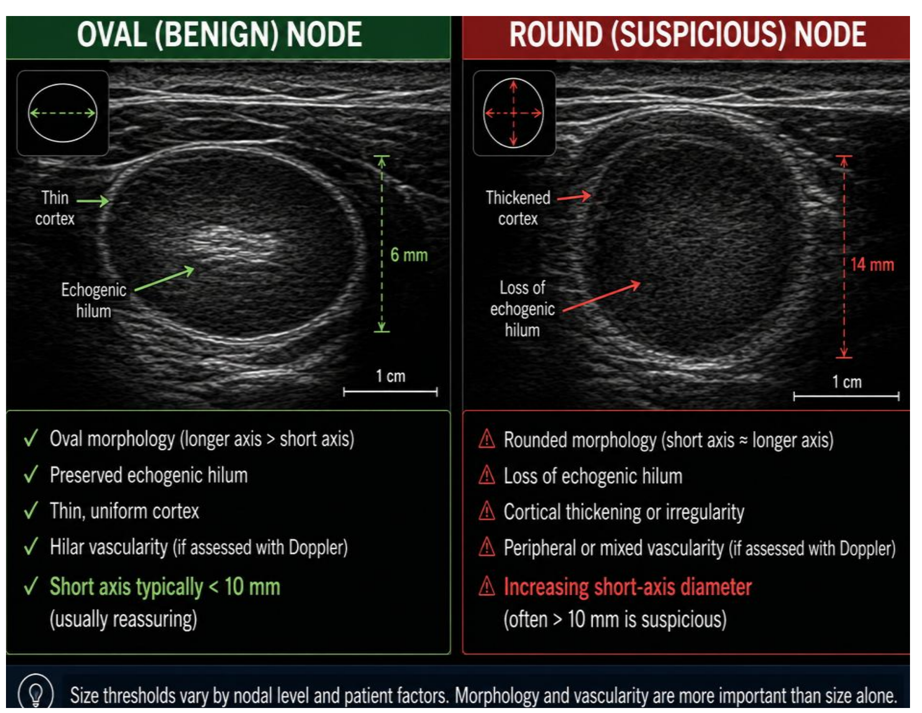
Does Size Matter? Size alone is a poor discriminator large nodes may be reactive small nodes may still contain metastases morphology matters more than size

Always measure the SHORT axis
Normal: JDG node <11mm

Other cervical levels <10mm *(van den Brekel et al. Radiology, 1990)*

Don't let small size falsely reassure you.



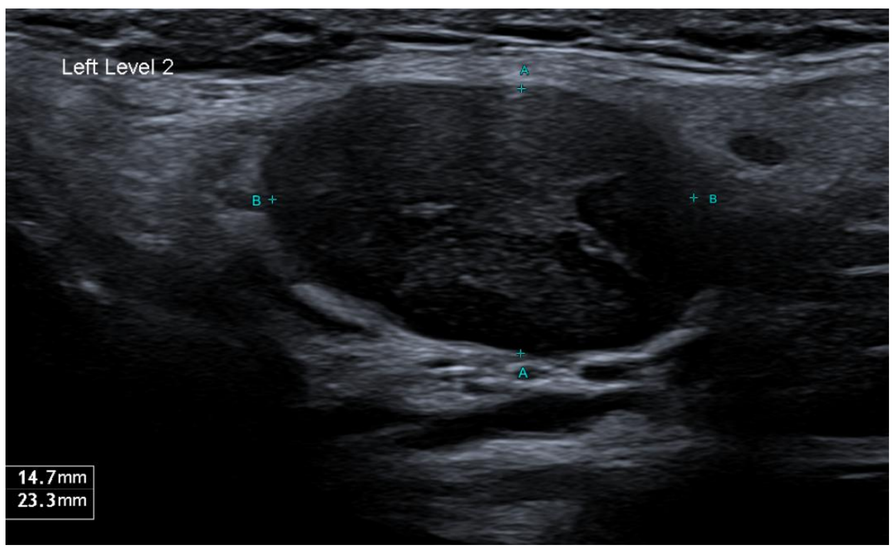


Systematic Assessment - Margins

Benign Nodes
Usually oval in appearance
Preserve normal nodal architecture
Longer than they are wide

Suspicious Nodes
Become more rounded
Loss of normal architecture
Often associated with cortical change and hilum loss

Why does shape change?
Reactive change tends to preserve nodal structure.
Metastatic infiltration distorts the node, producing a rounder morphology.



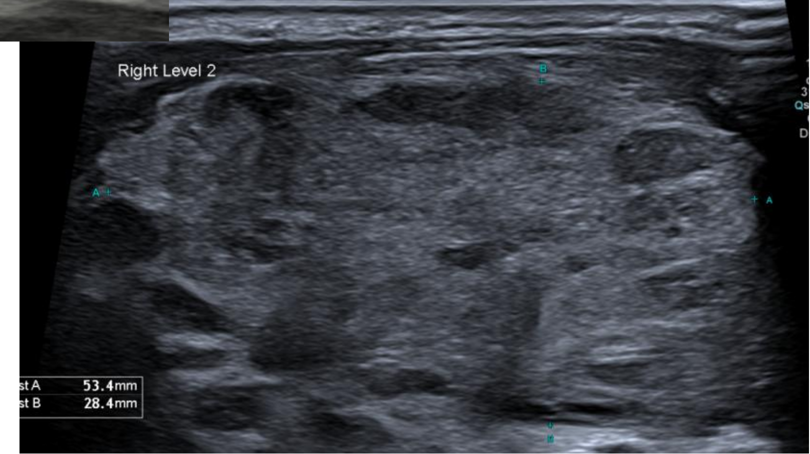
Systematic Assessment - Cortex & Hilum

Normal Node
Uniformly thin hypoechoic cortex
Preserved echogenic central hilum
Thin smooth capsule
Preserved surrounding fat planes
Oval morphology

Suspicious Node
Rounded morphology
Loss of normal nodal architecture
Irregular capsular contour
Adjacent soft tissue distortion

Extracapsular Spread (ECS)
Capsular irregularity or breach
Perinodal soft tissue oedema/distortion
Loss of surrounding fat planes
“Splattered egg” appearance

⚠ ECS is associated with more aggressive disease and may alter staging and treatment planning.



The appearances are of a node involved by metastatic malignancy with features favouring metastatic squamous carcinoma.

Key Suspicious Nodal Features

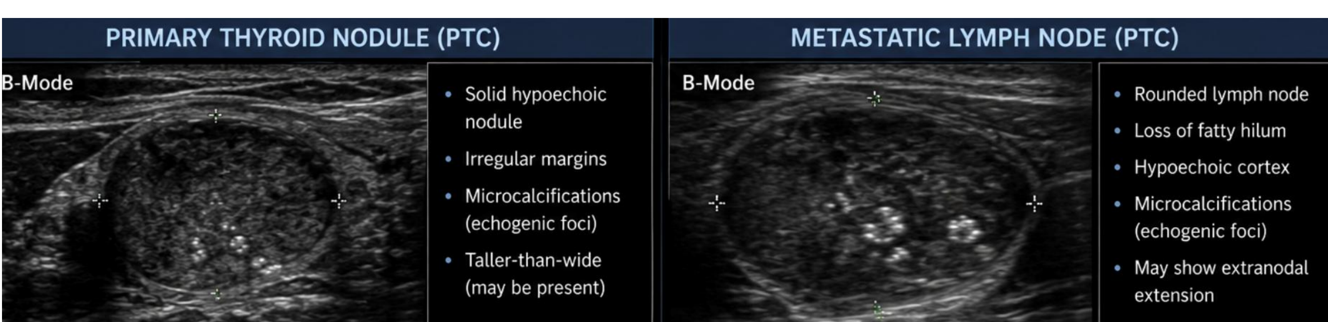
Necrosis
Highly suspicious for metastatic SCC.

Cystic necrosis
HPV-related SCC
Papillary thyroid carcinoma
Tuberculosis

Coagulative necrosis
Echogenic internal debris
Ill-defined architecture

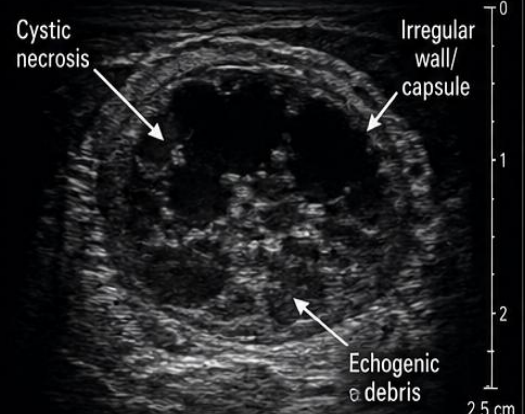
Echogenicity:
Markedly hypoechoic / pseudocystic
Think lymphoma.

Microcalcification
Papillary thyroid carcinoma metastasis.
Often mimics the appearance of the thyroid nodule



1. NECROSIS

Highly suspicious feature



Cystic necrosis may be seen in:

- HPV-related SCC metastases
- Papillary thyroid carcinoma metastases
- Tuberculous lymphadenitis

Coagulative necrosis:

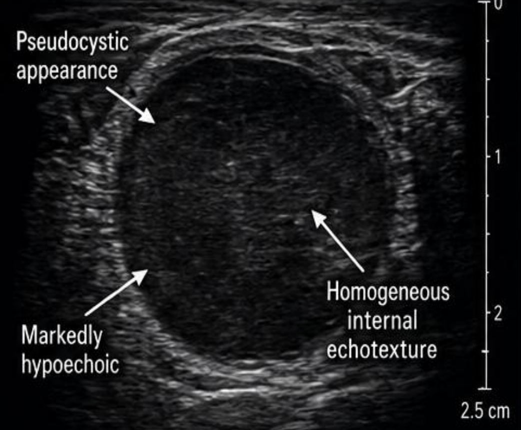
- Echogenic internal debris
- Irregular internal architecture
- Loss of normal nodal morphology

Necrosis within a cervical lymph node is highly suspicious for metastatic disease, particularly SCC.

2. ECHOGENICITY

Markedly hypoechoic / pseudocystic nodes:

Consider lymphoma



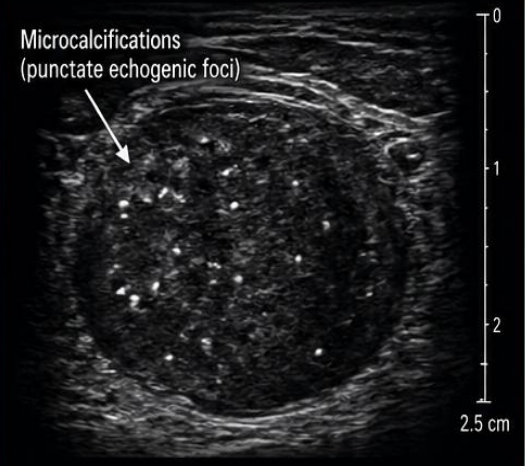
- Often homogeneous in appearance
- May mimic cystic change
- Frequently multifocal

Markedly hypoechoic, homogeneous nodes should prompt consideration of lymphoma.

3. CALCIFICATION

Microcalcification:

⚠ Strongly associated with papillary thyroid carcinoma metastases



- Punctate echogenic foci
- May demonstrate posterior acoustic shadowing

Presence of microcalcification strongly suggests papillary thyroid carcinoma metastasis.

Colour Doppler

Useful Adjunct - ⚠ Doppler supports morphology
Not a stand alone sign

Benign Doppler Pattern
Central hilar vascularity
Ordered branching vessels
Preserved hilar flow

Suspicious Doppler Pattern
Peripheral/capsular flow
Chaotic vascularity
Absent hilar flow

Suspicious nodal vascularity
demonstrating peripheral flow
and loss of normal hilar vascularity

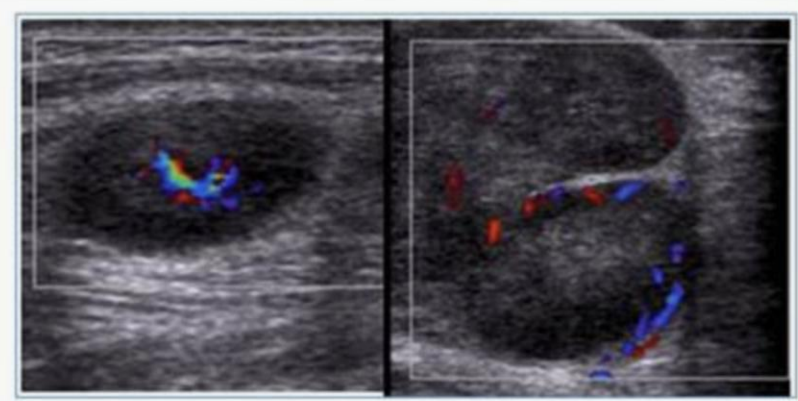
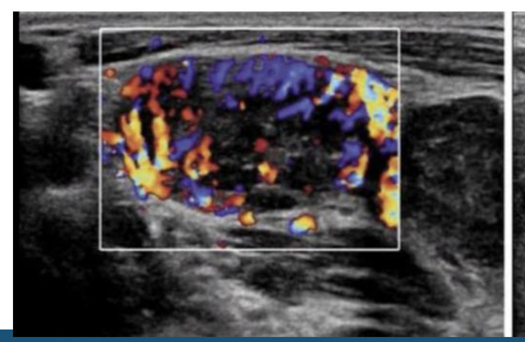
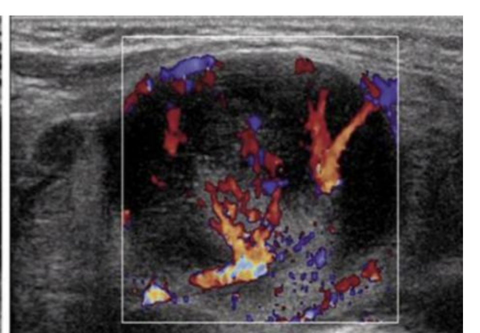


Figure 6A & B. Colour Doppler reveal Well-Defined Oval Shape Lymph Node showing Central Type of Vascular Pattern in Benign Case (Figure A), while Peripheral Vascular Pattern in Malignant Lymph Node (Figure B)

Abdelgawad et al. Egypt J Radiol Nucl Med. 2020





Features Suspicious of Malignancy

Morphological

Features Raising Suspicion
Morphology

Round shape
Focal cortical thickening
Loss/displacement of hilum
Irregular margins

Internal Architecture
Necrosis
Calcification
Marked hypoechogenicity

Vascular

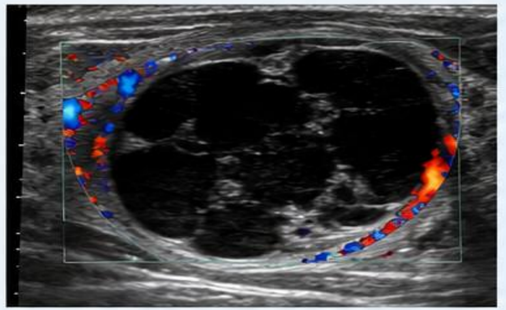
Vascularity
Peripheral flow
Chaotic vessels
Loss of hilar branching

Key Message
Malignancy is suggested by pattern recognition - not isolated signs.

Specific Nodal Pathologies

Metastatic SCC

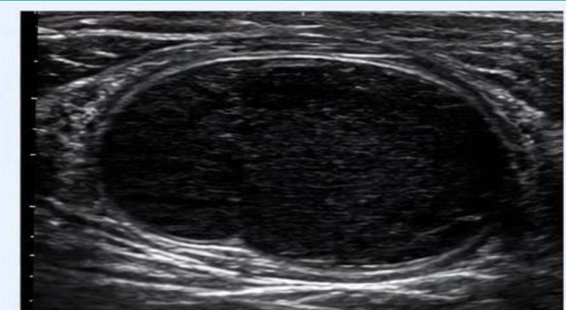
- Rounded morphology
- Hilum loss
- Peripheral flow
- Necrosis / cystic change



Necrotic metastatic SCC node with rounded morphology and hilum loss.

Lymphoma

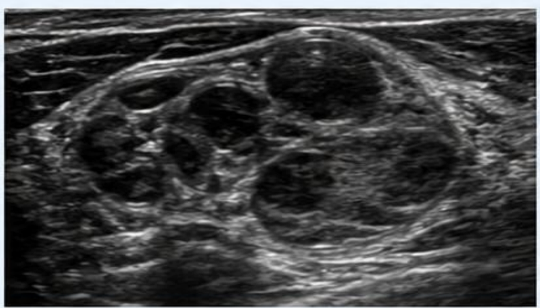
- Markedly hypoechoic
- 'Pseudocystic' appearance
- Multifocal nodal enlargement



Lymphomatous node demonstrating markedly hypoechoic pseudocystic appearance.

Tuberculous Lymphadenitis

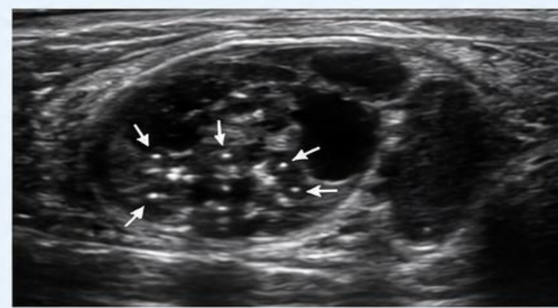
- Matted nodes
- Central necrosis
- Perinodal inflammation



Tuberculous lymphadenitis with matted necrotic nodes.

Papillary Thyroid Carcinoma Metastases

- Microcalcification
- Cystic change



Metastatic papillary thyroid carcinoma with nodal microcalcification.

When to Refer / Recommend Biopsy

USS Features Warranting Referral

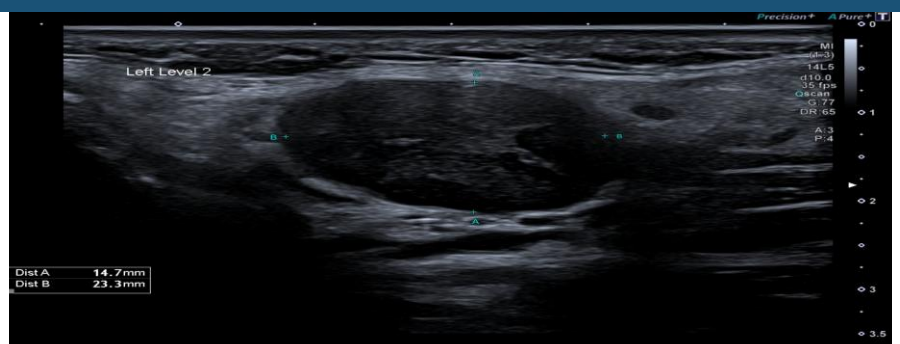
Rounded morphology
Eccentric cortical hypertrophy
Loss of hilum
Necrosis
Peripheral vascularity
Matted nodes

Clinical Red Flags

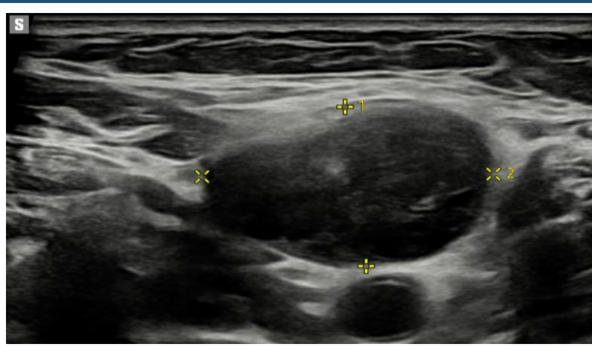
Persistent node >6 weeks
Increasing size
Firm/non-tender node
Weight loss
Night sweats
Known malignancy

NICE guidance NG12: refer under 2-week wait for unexplained lymphadenopathy with features of concern

Case Examples - Malignant Nodal Pathology

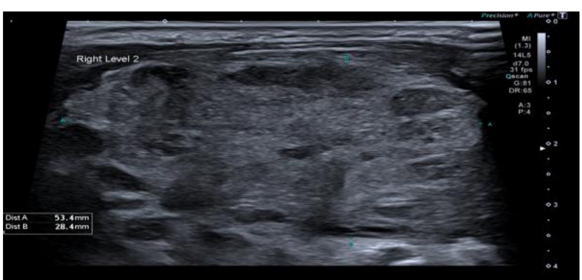
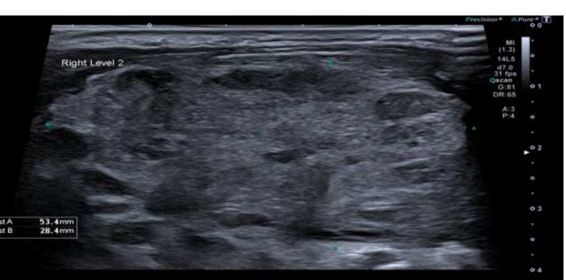


Metastatic SCC — Left Level 2

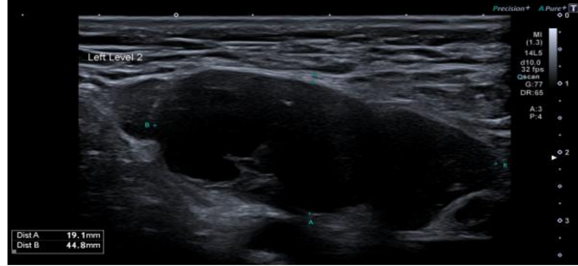


Cystic SCC Node — Right Level 3

Non-Small Cell Carcinoma — Left Level 4

Metastatic SCC with ECE — Right Level 2



SCC Metastatic Node — Left Level 2

Summary

Key take-home messages

- Morphology matters more than size
- Early malignant change often begins in the cortex
- Eccentric cortical hypertrophy is an early red flag
- Necrosis is highly suspicious for metastatic SCC
- Doppler supports morphology - it does not replace it
- Always interpret nodes in clinical context

Thank you — Questions?

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