

Regarding differential diagnosis for neck symptoms:

For patients with neck pain and/or cervical radiculopathy see below.

Palpable neck masses may be evaluated with CT, MR, or US examination.

If the palpable lesion is within the thyroid gland, US examination is usually the study of choice. The main purpose of the examination is to determine whether a thyroid nodule is best ignored, biopsied, or followed. There are some directions regarding this decision in the document “PIF Neck”.

If the palpable lesion is not within the thyroid gland, US, CT, or MR may be performed. For CT and MR studies, a marker should be placed at the location of the mass. Purposes of the examination include:

1. To establish whether or not a normal structure accounts for the perceived “mass”. Possibilities include asymmetric subcutaneous fat, muscles, veins, or arteries (including a tortuous carotid artery).
2. To establish whether the mass represents a simple lipoma.
3. To establish the location of the mass (see below template for a list of anatomic structures and spaces). Each space has a different set of causes for a mass, discussion of which is beyond the scope of this document.

Differential Diagnosis for Neck Pain

Neck Pain	Goroll & Mulley	Porter	Labus & Kowalak	Kasper	Paulman	Wasson	Total	Collected Cases
Cervical disc disease	x	x	x	x	x	x	6	8
Meningitis	x	x	x		x	x	5	
Angina pectoris	x	x		x		x	4	
Muscle spasm	x	x	x			x	4	
Muscle strain	x	x	x			x	4	
Cervical spondylosis	x	x		x		x	4	9
Fracture		x	x			x	3	10
Ankylosing spondylitis			x	x			2	
Rheumatoid arthritis			x	x			2	1
Metastatic cancer				x		x	2	5
Carotid or vertebral artery dissection		x					1	2
Giant-cell arteritis	x						1	
Laryngeal cancer			x				1	
Primary neoplasm		x					1	4
Polymyalgia rheumatic	x						1	
Thyroiditis	x						1	
Torticollis			x				1	
Infection				x			1	2
Mechanical neck pain					x		1	
Cervical dystonia						x	1	

Differential Diagnosis for Neck Pain with Clinical and Imaging Findings

Cause	Clinical Features	Imaging Findings
Spinal Cord and Spinal Canal		
Meningitis	Fever, stiff neck, mental status changes, photophobia, phonophobia	Thickened and/or enhancing meninges.
Metastatic carcinoma	Known primary tumor; systemic features (weight loss, fever, failure to thrive).	MR, CT-myelo: intramedullary, intradural extramedullary, and extramedullary masses; MR: leptomeningeal enhancement.
Primary spinal canal or cord tumor	Associated neurologic deficit.	Spinal cord or intradural-extramedullary tumor
Epidural abscess	Fever, elevated WBC, elevated ESR and CRP.	Epidural soft tissue lesion showing decreased SI on T1WI and increased SI on T2WI lacking central enhancement.
Paraspinal Structures		
Metastatic carcinoma	Known primary tumor; systemic features (weight loss, fever, failure to thrive).	MR, CT: lymphadenopathy.
Carotid or vertebral artery dissection	Known vascular disease; neck pain or headache	Visualization of a flap, reduced caliber, or occlusion
Giant cell arteritis	Jaw pain, tongue pain, bruit, tenderness/sensitivity over scalp	“Dark halo” on color duplex ultrasonography, wall thickening and enhancement of the temporal artery on MRI/MRA.
Laryngeal cancer	Change in voice.	Mass or distortion of spinal cords.
Thyroiditis	Hyperthyroidism features (diaphoresis, temperature intolerance, anxiety, etc.)	Enlarged, heterogenous thyroid gland.
Bones		
Metastatic carcinoma (including multiple myeloma)	Known primary tumor; systemic features (weight loss, fever, failure to thrive).	MR, CT, XR: Destruction of bone cortex and marrow; replacement of marrow with tumor.
Post-traumatic fracture	Injury.	MR, CT, XR: wedge compression deformity; CT, XR: demineralization; MR: decreased SI on T1WI and increased SI on T2WI.
Ankylosing spondylitis	Associated inflammatory bowel disease; spondyloarthropathy.	MR, CT, XR: squared vertebral bodies; CR, XR: “shiny corners”.
Osteomyelitis	Fever, elevated WBC, elevated ESR and CRP.	MR, CT, XR: Destruction of bone cortex and marrow; replacement of marrow with tumor.
Intervertebral Discs and Facet Joints (Each Visualized Level)		
Cervical disc disease	Associated radicular symptoms.	Disc contour abnormality; intrathecal mass (with an extruded fragment), associated loss of disc height in some cases.

Cervical spondylosis	Polyarthropathy. Radiculopathy with associated stenosis from bone spur or synovial cyst.	Joint space narrowing, osteophyte formation, subchondral sclerosis/cysts. Synovial cyst.
Rheumatoid arthritis	Decreased range of motion; positive RF; positive anti-CCP; rheumatoid arthritis of other joints.	Loss of joint space, erosions on XR, CT, and MR; abnormal marrow SI MR.
Diskitis	Fever, elevated WBC, elevated ESR and CRP.	MR: decreased SI on T1WI and increased SI on T2WI; MR, CT, XR: bone destruction with associated osteomyelitis.
Torticollis	Neck pain; persistently turned head	Persistently turned head.
Processes with minimal or no findings on imaging		
Angina pectoris, muscle spasm, muscle strain, polymyalgia rheumatica, mechanical neck pain, cervical dystonia.		
ABBREVIATIONS		
CRP = C reactive protein; CT = computed tomography; ESR = erythrocyte sedimentation rate; SI = signal intensity; T1WI = T1 weighted images; T2WI = T2 weighted images; US = ultrasound; WBC = white blood cell count		

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