

Referring Physician Ordering Guide: What to Order When

Neuroradiology Ordering Guidelines

Brain

Indication	Preferred Study
Headache	CT head without contrast for acute (“worst headache of life”). MRI without contrast in young patients; with contrast over 50yo/cancer hx
Trauma	CT head without contrast (acute). Concussion/TBI: MRI without and with contrast with DTI/SWI
Suspected intracranial hemorrhage	CT head without contrast
Acute neurological changes	CT head without contrast Subsequent study: MRI with and without contrast
Acute stroke/TIA	CT head without contrast (if candidate for thrombolysis) Subsequent studies: MRI brain without contrast, MRA brain and MRA neck without contrast as indicated
Hydrocephalus	If concern for shunt malfunction CT head without contrast. Alternative: MRI with and without contrast
Seizure	First (New Onset) seizures: MRI Brain with and without contrast Sz protocol (CT Head if patient unstable / concern for ICH).
Temporal lobe epilepsy	MRI without and with contrast Sz protocol. Brain SPECT as needed
Dementia / Memory loss	MRI brain without contrast with SWI and coronal T1. NM/PET can also be considered for Alzheimer’s/Parkinsonian diagnosis

Normal pressure hydrocephalus, aqueductal stenosis, Chiari I malformation	Brain MRI without contrast Aqueduct stenosis: CISS/thin T2 FS Sag & CSF flow study
Mass	MRI without and with contrast with T1 thin post. ONLY if MRI contraindicated: CT without and with contrast
Aneurysm or AVM	“Screening” MRA Head (non-contrast) versus CTA head with contrast. Follow-up studies with non-con MRA
Infection	MRI without and with contrast. ONLY if MRI contraindicated: CT without and with contrast

CSF leak	MRI without and with contrast with thin T2FS/CISS sequences. Consider follow-up CT Cisternogram/myelogram as indicated (requires intrathecal contrast injection – discuss with radiologist).
Cranial neuropathy	MRI Brain without and with contrast (Skull base/trigeminal protocol)
Pituitary dysfunction	MRI Brain with and without contrast (Pituitary protocol)
MS	Initial: MRI Brain, orbits, cervical, & thoracic with and without MS protocol Follow up: consider without contrast

Face

Indication	Preferred Study
Trauma	CT maxillofacial without contrast
Sinus disease	CT sinus without contrast. If suspected orbital/intracranial involvement: MRI Brain and Orbits without and with contrast
Infection	CT maxillofacial with contrast. Suspected orbit or brain extension: MRI Brain and Orbits without contrast
Hearing loss, vertigo	Conductive: CT temporal bones without contrast. Sensorineural: MRI IAC without and with contrast
TMJ pain	MRI temporomandibular joints
Possible metal in orbits and patient needs an MRI	Orbits x-ray

Neck/soft Tissue

Indication	Preferred Study
Carotid or vertebral artery stenosis	CTA neck with contrast. MRA neck without. Carotid Doppler ultrasound
Mass	CT neck with (high suspicion) versus without contrast (low suspicion, looking for ductal stone) Thyroid nodule: neck ultrasound. MR neck without and with contrast (ENT order; perineural spread)
Infection	CT neck with contrast
Neurologic deficit in brachial plexus	MRI brachial plexus without and with contrast
Carotid or vertebral artery Dissection	CTA Neck with contrast If cannot receive contrast: MRA neck without & T1 axials (Dissection protocol).

Cervical/Thoracic spine

Indication	Preferred Study
Trauma	CT thoracic spine without contrast. Acute neurologic deficit versus concern for ligamentous injury: MRI without contrast

Pain, degenerative changes, radiculopathy	MRI thoracic spine without contrast. Prior surgery: MRI spine without and with contrast (infection concern) vs CT (hardware loosening)
Mass	MRI without and with contrast
Infection	MRI without and with contrast. MRI contraindicated: CT with contrast

Lumbar spine

Indication	Preferred Study
Trauma	CT lumbar spine without contrast. Acute neurologic deficit versus concern for ligamentous injury: MRI without contrast
Pain, degenerative changes, radiculopathy, sciatica	MRI lumbar spine without contrast. Prior surgery: MRI spine without and with contrast (infection concern) vs CT (hardware loosening)
Pars stress injury	CT without contrast
Mass	MRI without and with contrast
Infection	MRI without and with contrast. MRI contraindicated: CT with contrast
Lumbosacral plexus abnormality	MRI lumbosacral plexus (pelvis) without contrast

Musculoskeletal Ordering Guidelines

Shoulder

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for occult fracture in younger patients. MR for occult fracture in older patients
Masses	X-ray first for bony lesions. Ultrasound for suspected lipoma. Otherwise MRI without and with contrast
Infection	MRI shoulder without and with contrast
General pain	MRI shoulder without contrast
Suspected rotator cuff tear	MRI shoulder without contrast
Proximal biceps injury	MRI shoulder without contrast
Suspected labral tear	MRI shoulder arthrogram (Ortho must order these)

Humerus (does not include joint)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for occult fracture in younger patients. MRI for occult fracture in older patients

Masses	X-ray first for bony lesions. Ultrasound for suspected lipoma. Otherwise MRI humerus without and with contrast
Infection	MRI humerus without and with contrast
General pain, muscle injury	MRI humerus without contrast (ask radiologist if shoulder or elbow MRI might be more optimal)

Elbow

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for occult fracture in younger patients. CT for arthroplasty complications. MRI for occult fracture in older patients
Masses	X-ray first for bony lesions. Ultrasound for suspected lipoma. Otherwise MRI elbow without and with contrast
Infection	MRI elbow without and with contrast
General pain, epicondylitis	MRI elbow without contrast
Distal biceps injury	MRI elbow without contrast
Osteochondral lesion	MRI elbow without contrast
Nerve injury/entrapment syndrome	MRI elbow without contrast

Forearm (does not include joint)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for occult fracture in younger patients. MRI for occult fracture in older patients
Masses	X-ray first for bony lesions. Ultrasound for suspected lipoma. Otherwise MRI without and with contrast
Infection	MRI without and with contrast
General pain, muscle injury	MRI without contrast (ask radiologist if elbow or wrist MRI might be more optimal)
Nerve injury/entrapment	MRI without contrast

Wrist

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. MRI for occult fracture (such as scaphoid and distal radius)
Masses	X-ray first for bony lesions. Otherwise MRI without and with contrast
Infection	MRI without and with contrast
General pain, tendinopathy	MRI without contrast

Hand (from MCP joints to fingertips)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. MRI for occult fracture
Masses	X-ray first for bony lesions. Otherwise MRI without and with contrast
Infection	MRI without and with contrast
General pain, muscle injury, rheumatologic diseases	MRI without contrast

Hip

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for arthroplasty complications. MRI for occult fracture
Masses	X-ray first for bony lesions. US for suspected lipoma. Otherwise MRI hip without and with contrast

Infection, decubitus ulcer	MRI hip without and with contrast
General pain, muscle injury	MRI hip without contrast
Arthritis	MRI hip without contrast
Osteonecrosis	MRI hip without contrast
Stress injury	MRI hip without contrast
“Groin pull,” sports hernia	MRI hip without contrast: state “sports hernia” in reason for study when ordering

Sacroiliac Joints

Indication	Preferred Study
Pain, r/o sacroiliitis	X rays first, then MRI sacroiliac joints without contrast if x rays equivocal
Synovitis	MRI sacroiliac joints with/without contrast (this should only be ordered by Rheumatology)

Femur/Thigh (does not include joint)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for hardware complications. MRI femur/thigh for occult fracture
Masses	X-ray first for bony lesions. US for suspected lipoma. Otherwise MRI femur/thigh without and with contrast
Infection	MRI femur/thigh without and with contrast
General pain, muscle injury, hamstring injury	MRI femur/thigh without contrast (ask radiologist if hip or knee MRI might be better study)

Knee

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for arthroplasty complications. MRI for occult fracture
Masses	X-ray first for bony lesions. US for suspected lipoma or Baker's cyst. Otherwise MRI without and with contrast
Infection	MRI without and with contrast
General pain, internal derangement (i.e. ligament or meniscal tear)	MRI without contrast. CT arthrogram in patients who cannot have an MRI
Meniscal tear in setting of prior partial meniscectomy	MRI knee arthrogram
Arthritis	MRI without contrast
Osteonecrosis	MRI without contrast
Cartilage and Osteochondral Lesions	MRI without contrast and with T2 mapping

Tibia/Fibula/Calf (does not include joint)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. MRI tibia/fibula/calf for occult fracture
Masses	X-ray first for bony lesions. US for suspected lipoma. Otherwise MRI tibia/fibula/calf without and with contrast
Infection	MRI tibia/fibula/calf without and with contrast
General pain, muscle injury	MRI tibia/fibula/calf without contrast (ask radiologist if knee or ankle MRI might be better study)
Stress injury, "shin splints"	MRI tibia/fibula/calf without contrast

Ankle (from Achilles tendon to tarsal-MT joints)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures. CT for arthroplasty complications. MRI for occult fracture
Masses	X-ray first for bony lesions. Otherwise MRI without and with contrast
Infection, osteomyelitis, ulcer	MRI ankle without and with contrast
General pain, ligamentous injury	MRI ankle without contrast
Achilles injury	MRI ankle without contrast
Plantar fasciitis	MRI ankle without contrast
Tarsal coalition	CT or MRI ankle without contrast
Cartilage and Osteochondral Lesions	MRI ankle without contrast and with T2 mapping
Tarsal tunnel syndrome	MRI ankle without contrast
Posterior Tibial Tendon Pathology	MRI ankle without contrast

Foot (From Base of Metatarsals through Toes)

Indication	Preferred Study
Trauma, surgical hardware	X-ray first. CT for pre-operative planning of fractures
Masses	X-ray first for bony lesions. Otherwise MRI foot without and with contrast
Infection, osteomyelitis, ulcer	MRI foot without and with contrast
General pain	MRI foot without contrast
Plantar plate injury, turf toe	MRI foot without contrast
Morton's neuroma	MRI foot without and with contrast

Thoracic imaging Guidelines

Indication	Preferred Study
Chronic Dyspnea	Chest CT without contrast
Hemoptysis	Chest CT with contrast. If contrast contraindicated then chest CT without contrast may be ordered.
Lung cancer-Noninvasive staging	Chest CT with or without contrast if renal failure or PET/CT
Screening for pulmonary metastases	CT chest without contrast
Blunt chest trauma, suspect aortic injury	CTA chest with contrast
Acute chest pain suspect aortic dissection	CTA chest with and without contrast Alternative: MRA chest and abdomen if CT contrast is contraindicated.
Suspected pulmonary embolism	CTA chest with contrast is current standard of care to exclude pulmonary embolism. Alternative: When CT contrast contraindicated, consider ventilation/perfusion scan and lower extremity venous Doppler ultrasound to rule out deep venous thrombosis.
Acute respiratory illness- immunocompetent patient	Chest X-ray. Chest CT without contrast when x-ray findings inconclusive.
Lung Cancer Screening	Low Dose Chest CT
Chest Wall Mass	Chest CT with contrast; MRI chest if recommended by Radiologist
Rib Lesion	Chest CT without contrast. If lower rib, CT abdomen without contrast

Gastrointestinal Imaging Guidelines

Indication	Preferred Study
Acute abdominal pain, fever, R/O Abscess	CT abdomen and pelvis with contrast
Pregnant patient with acute abdominal pain	Ultrasound, if indeterminate then MRI Abdomen and pelvis without contrast
Pancreatitis	CT abdomen with contrast. Ultrasound to exclude gallstones
Blunt trauma	CT Chest/Abdomen/Pelvis with contrast
Crohn's disease	CT or MR enterography. These should be ordered by GI service.
Jaundice	CT abdomen with contrast, MRCP with contrast if CT equivocal or normal
Left lower quadrant pain	CT abdomen/pelvis with contrast
Liver lesion initially identified on U/S or CT	MRI abdomen with contrast
Palpable abdominal mass	CT abdomen/pelvis with contrast.
Right lower quadrant pain suspected appendicitis	CT abdomen/pelvis with contrast
Dysphagia- unexplained or retrosternal	Esophagram
Right upper quadrant pain	Ultrasound limited. If only gallstones present and no fever or elevated WBC then hepatobiliary scan.
Suspected liver metastases	CT abdomen with contrast. MRI if CT equivocal
Suspected small bowel obstruction	CT abdomen and pelvis with contrast
Perianal/Perirectal Fistula evaluation	MRI Pelvis with/without contrast

Genitourinary Imaging Guidelines

Indication	Preferred Study
Flank pain- suspected stone disease	CT abdomen and pelvis without contrast
Scrotal pain, mass, trauma	Scrotal ultrasound
Acute pyelonephritis	CT abdomen and pelvis without and with contrast.. Alternative: Renal ultrasound less sensitive/specific than CT
Hematuria	CT IVP
Bladder cancer	CT IVP
Renal mass	CT abdomen with/without contrast. Alternative: MRI abdomen with/without contrast
Incidental adrenal mass	CT without contrast. If indeterminate then CT without and with contrast. Alternative: MRI abdomen with/without contrast if CT inconclusive
Renal failure, rule out obstruction	Ultrasound
Renal trauma	CT abdomen and pelvis with contrast
Renovascular hypertension	CTA or MRA abdomen with contrast

Women's Imaging Guidelines

Indication	Preferred Study
Abnormal vaginal bleeding, pelvic pain	Transvaginal/Transabdominal pelvic ultrasound
Uterine, Cervical, Ovarian Mass	Transvaginal/Transabdominal pelvic ultrasound. Short term pelvic ultrasound follow up often required based on initial findings. MRI female pelvis with/without contrast if US equivocal.