

Clinical problem	First imaging choice	Second imaging choice	Comments
HEAD, NECK AND SPINE			
Cauda Equina Syndrome	MRI spine without contrast	CT spine without contrast	CT only if MRI is contraindicated and has low yield
Cerebral aneurysm	MRA head without contrast	CTA head without/with contrast	For patients with suspected or family history of aneurysm or follow up to prior known diagnosis
Cerebrovascular accident	CT head without contrast	MRI head without contrast	CT is needed first to exclude intracerebral hemorrhage
Dementia-Movement Disorder	CT head without contrast	MRI head without contrast	
Dysphagia	Barium Swallow	Modified barium swallow (with speech therapist) if aspiration suspected	CT neck with contrast if neck mass suspected
Head trauma	CT head without contrast	MRI head without contrast	MRI is indicated only if CT findings requires further imaging. Routine x ray series (skull, sinuses, facial bones, etc.) has very low sensitivity for significant injury
Headache- intracranial infection/inflammation	MRI head without/with contrast	CT head without/with contrast	
Headache-chronic	CT head without contrast	MRI head without contrast	
Headache-worst headache, sudden onset	CT head without contrast	CTA head without/with contrast, MRA head without contrast	If subarachnoid hemorrhage is suspected, CSF sampling may be needed since head CT can occasionally be false negative
Hearing loss - temporal bone trauma	CT temporal bone without contrast		
Hearing loss - sensorineural	MRI IAC without/with contrast	CT temporal bone without contrast	CT temporal bone 1st choice if hearing loss is not sensorineural type
Intracranial bleed	CT head without contrast	MRI head without contrast	MRI is indicated only if CT findings requires further imaging
Myelopathy- spinal infection or metastatic	MRI spine without/with contrast	CT spine with contrast	CT only if MRI is contraindicated
Myelopathy-traumatic	CT spine without contrast	MRI spine without contrast	MRI if CT is inconclusive or further imaging desired
Neck vascular injury	CTA neck without/with contrast		Conventional angiography may be needed for vascular injury
Pituitary lesion or neoplasm	MRI sella without/with contrast	CT sella without/with contrast	CT only if MRI is contraindicated and has low yield
Proptosis, ophthalmoplegia	MRI orbit without/with contrast	CT orbit/head with contrast	CT is first choice if trauma is present
Seizures-Epilepsy	CT head without contrast	MRI head without/with contrast	Baseline CT is to exclude urgent findings like bleed. MRI is needed to search for seizure cause
Sinusitis- acute or chronic	CT sinus without contrast	X-ray sinus series	Limited sinus CT only uses few skipped coronal images; CT sinus with contrast or MRI sinus without/with contrast if further imaging is needed
Spine-Cervical stenosis or spondylosis	MRI spine without contrast	CT spine without contrast or spine x-rays	
Spine-Lumbar stenosis or spondylosis or sciatica	MRI spine without contrast	CT spine without contrast or spine x-rays	MRI with contrast if prior back surgery is performed
Spine injury- mild, no neurologic symptoms	X-ray Spine	CT Spine without contrast	
Spine injury- moderate/severe or neurologic symptoms	CT spine without contrast	MRI spine without contrast	MRI if spinal ligamentous injury is suspected or CT is not helpful
Vertigo-Ataxia, no trauma	MRI head without contrast	CT head without contrast	MRI spine without contrast if spinal origin of ataxia is suspected
Vision loss- sudden or transient	MRA head/neck without/with contrast	CTA head/neck without/with contrast	
CHEST			
Acute respiratory illness	X-ray chest	CT chest with contrast	CT is reserved for complicated or unresolved cases, such as unresolved pneumonia or other lung disease
Breast mass	Diagnostic mammogram+US breast, if age over 30	US breast, if age below 30	
Chest pain- aortic dissection or injury	CTA chest+abdomen without/with contrast	MRA chest/abdomen without/with contrast	Baseline chest x-ray is needed. Trans-esophageal echo if imaging findings are inconclusive
Chest pain - pulmonary embolism	CTA chest without/with contrast	V/Q scan	Baseline chest x-ray is needed
Dyspnea or hemoptysis	X-ray chest	CT chest with contrast	
Lung mass	CT chest with contrast	FDG PET	Xray chest is 3rd alternative and can be used as initial test but it is not very sensitive for small or subtle lesions
Metastasis screening	CT chest with contrast	FDG PET	Start with baseline chest x-ray
Rib injury/fracture	X-ray chest+Rib series	CT chest without contrast	CT chest with contrast for complicated cases
Solitary pulmonary nodule	CT chest without contrast	FDG PET	IV contrast is often needed for CT to evaluate mediastinum
BONE			
Bone tumor	X-ray	MRI without/with contrast	CT if MRI is inconclusive
Extremity (hip, knee, wrist, etc.) pain or injury	X-ray	MRI without contrast	CT if MRI is not feasible or inconclusive
Infection/Osteomyelitis	X-ray	MRI without/with contrast	CT with contrast and 3-phase bone scan are third alternatives
Metastatic bone disease	Whole body bone scan	Skeletal survey	Skeletal survey only for Myeloma
Soft tissue mass	MRI without/with contrast	CT without/with contrast	Start with x-rays. If chest or abdominal wall mass, CT is first choice
Stress/insufficiency fracture	X-ray	MRI without contrast	CT is third alternative if MRI is inconclusive

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ABDOMEN			
Abdominal trauma	CT abdomen/pelvis with PO+IV contrast	CT abdomen/pelvis with IV contrast only	Other tests (US, MRI, KUB, barium studies, etc.) depend on CT findings
Acute abdominal pain	CT abdomen/pelvis with PO+IV contrast		Other tests (US, MRI, KUB, barium studies, etc.) depend on CT findings
Adnexal mass	US pelvis TA+TV	MRI Pelvis without/with contrast	Start with bHCG test when needed. CT abdomen with PO+IV contrast if PID is suspected
Adrenal nodule-indeterminate	CT abdomen without/with IV contrast	MRI abdomen without contrast	MRI first choice in younger patients given high CT radiation dose
Flank pain/ renal stone protocol	CT abdomen/pelvis without PO or IV contrast	KUB	KUB or US renal is preferred for uncomplicated subsequent symptoms given high CT radiation dose
Hematuria	CT urogram without/with IV contrast	US renal	No PO contrast used for CT. KUB is third alternative
Jaundice	US Abdomen	CT abdomen with PO+IV contrast	MRI Abdomen without contrast (MRCP) is third alternative
Liver mass	MRI Abdomen without/with contrast	CT abdomen without / with PO+IV contrast	FDG PET and US Abdomen are third alternatives
Postmenopausal vaginal bleed	US pelvis TA+TV	MRI pelvis without/with contrast	Transvaginal (TV) US has higher yield and should be included in all cases unless contraindicated
Pulsatile abdominal mass	CTA Abdomen without/with contrast	US aorta	US has limited coverage and sensitivity. MRA abdomen without/with contrast is third alternative
Renal failure	US renal	MRA kidneys without/with IV contrast	MAG3 nuclear medicine renal scan is third alternative
Renal mass-indeterminate	CT abdomen without/with IV contrast + PO Contrast	MRI kidney without/with IV contrast	US renal is third alternative. MRI first choice in younger patients given high CT radiation dose
Scrotal pain	US scrotum		Other imaging tests depend on ultrasound findings
Urinary trauma	CT abdomen/pelvis with IV contrast	US renal	No PO contrast. Request delayed scan to check for urinary extravasation
UTI/pyelonephritis	CT abdomen/pelvis with PO+IV contrast	US renal	Correlation with urinalysis is needed since imaging may be negative in infection
PEDIATRIC			
Fever without source	X-ray chest		Other tests (whole body bone scan, CT abdomen/pelvis with PO+IV contrast, etc.) depend on clinical findings
Head Trauma	CT head without contrast	MRI head without contrast	MRI is indicated only if CT findings requires further imaging. Routine x ray series (skull, sinuses, facial bones, etc.) has very low sensitivity for significant injury
Hematuria	US Renal	KUB	CT abdomen/pelvis without IV or PO contrast (stone protocol) is third alternative
Hip dysplasia-6 months or older	X-ray hips	US Hip	US can be attempted between 6-12 months but has low sensitivity at this period
Hip dysplasia-newborn	US hip	X-ray hips	If positive clinical finding is present, wait 2 wks, if screening for dysplasia due to risk factors with normal exam, wait 4-6 wks after birth
Kidney-abdomen trauma	CT abdomen/pelvis with IV contrast	KUB	
Limping	X-ray hips/lower extremity		Bone scan or MRI, if x-rays are not helpful
Nonaccidental trauma	Skeletal survey	CT head without contrast or organ of interest (with IV contrast if chest/abdomen/pelvis)	Bone scan is third alternative. MRI head without contrast if CT head is abnormal
Pyloric stenosis	US Abdomen	UGI barium study	KUB is needed as baseline and to check for gastric distention
Seizures-Epilepsy	CT head without contrast	MRI head without/with contrast	Baseline CT is to exclude urgent findings like bleed. MRI is needed to search for seizure cause
UTI	VCUG+ US renal	CT abdomen/pelvis with PO+IV contrast	CT for complicated cases
Vomiting	X-ray abdomen	UGI barium study	Small bowel series are not very helpful in childhood