

# Index

- AAA. *See* abdominal aortic aneurysm
- abdomen, MRI of,  
  for AAA, 574–575  
  for acute appendicitis, 570  
  for acute cholangitis, 568  
  for acute pancreatitis, 570  
  for aortic dissection, 575  
  for ascites, 581  
  for cholecystitis, 568  
  for choledocholithiasis, 580  
  for cholelithiasis, 579  
  clinical images for, 571–584  
  clinical indications for, 568  
    under ACR guidelines, 569  
  for cysts  
    hepatic, 582  
    pancreatic, 583  
    renal, 575  
  diagnostic capabilities of, 568–570  
  for hepatocellular carcinoma, 582  
  for hydronephrosis, 578  
  imaging limitations for, 570  
  for metastatic liver disease, 583  
  for renal artery stenosis, 577  
  for renal cell carcinoma, 576  
  for splenic infarct, 581  
  for splenomegaly, 580
- abdomen-pelvis angiography, with CT,  
  489–496  
  for AAA, 491–493  
  for aorto-iliac system, 489  
  clinical images of, 490–496  
  contrast allergy in, 489–490  
  diagnostic capabilities of, 489  
  dye infiltration and, 490  
  imaging limitations of, 489–490  
  indications for, 489  
  for mesenteric vessels, 489, 494–495  
  for pneumatosis coli, 496  
  pregnancy risks with, 490  
  radiation exposure with, 490
- renal dysfunction from, 490  
  for renal vasculature, 489  
  for splenic arteries, 493–494, 495–496  
  for venous thromboembolism, 489
- abdomen-pelvis, CT for, 473–474  
  with angiography, 489–496  
    for AAA, 491–493  
    for aorto-iliac system, 489  
    clinical images of, 490–496  
    contrast allergy in, 489–490  
    diagnostic capabilities of, 489  
    dye infiltration and, 490  
    imaging limitations of, 489–490  
    indications for, 489  
    for mesenteric vessels, 489, 494–495  
    for pneumatosis coli, 496  
    pregnancy risks with, 490  
    radiation exposure with, 490  
    renal dysfunction from, 490  
    for renal vasculature, 489  
    for splenic arteries, 493–494, 495–496  
    for venous thromboembolism, 489
- clinical images of, 474–475  
  of acute cholecystitis, 477–478  
  of appendicitis, 477  
  of diverticulitis, 476  
  of fractures, 481  
  of gastrointestinal obstructions, 475, 476  
  of gastrointestinal perforations, 475, 476  
  of hepatic abscess, 477  
  of hernias, 479, 480  
  of hiatal hernia, 479  
  of liver, 477  
  of mesenteric injury, 476  
  of ovaries, 480  
  in pancreas, 478–479  
  of pancreatitis, 478  
  of pseudocysts, in pancreas, 478  
  of renal injury, 479
- of splenic laceration, 478  
  of ureterolithiasis, 479  
  diagnostic capabilities for, 473–474  
  imaging limitations for, 474  
  indications for, 473
- abdomen-pelvis, ultrasound for, 313–324.  
  *See also* abdomen, plain  
    radiography for; abdominal aorta,  
    ultrasound for
- for cysts  
    nabothian, 320  
    ovarian, 322  
  diagnostic capabilities for, 313  
  of EMS, 314  
  of EUG, 317–320  
    EMS and, 319  
  of FF, 323  
    in pouch of Douglas, 323  
    in uterovesicular pouch, 323  
  for fibroids, 321  
    submucosal, 321  
  imaging limitations for, 313  
    for endovaginal imaging, 313  
    for transabdominal imaging, 313  
  indications for, 313  
  of IUP, 316  
    abnormal, 317  
  of molar pregnancy, 324  
  of ovaries, 314, 315  
    cysts in, 322  
  of uterus, 314–315  
    incarcerated, 324  
  of vaginal stripe, 314
- abdomen, plain radiography for, 90. *See also*  
  abdomen-pelvis, ultrasound for;  
  abdominal aorta, ultrasound for;  
  pediatric abdomen, plain  
    radiography for
- for abnormal fluid collections, 67  
  for appendicitis, 72  
  for bladder stones, 86

- abdomen, (*Continued*)  
 for bowel obstructions, 66  
   in large intestines, 75–76  
   Ogilvie's syndrome as, 78  
   in small intestines, 71  
 for cecal volvulus, 73  
 for Chilaiditi loops, 79  
 diagnostic capabilities of, 65–66  
   findings and, 66, 67  
   with normal film, 65–66  
 for elderly, 181, 193  
   for feeding tube placement, 193  
   for hiatal hernias, 193  
 for feeding tube replacement, 90  
 for free air, 69  
   retroperitoneal, 80  
 for gastrointestinal tract pathology, 67  
 for ileus, 66, 70  
 imaging limitations for, 67  
 indications for, 65  
 for pancreatic calcifications, 87  
 pediatric, 153–175  
 for perforated viscus, 66  
 for pneumatosis intestinalis, 79  
 for porcelain gallbladder, 88  
 for renal stones, 82  
 for retroperitoneal inflammation/injury, 67  
 for sigmoid volvulus, 74  
 for solid organs, 66–67  
 for staghorn calculi, 83  
 for toxic megacolon, 77  
 for ureteral stones, 67, 84–85  
 for uterine fibroid calcifications, 81  
 for vascular calcifications, 89
- abdomen, ultrasound for, 337–345. *See also*  
 appendicitis, acute; pancreatitis;  
 pyloric stenosis  
 for acute appendicitis, 337  
   clinical images of, 338–339  
 diagnostic capabilities of, 337–338  
 fluid status in, 382  
 for hernias, 338  
   clinical images of, 342  
   femoral, 338  
   incisional, 338  
   inguinal, 338  
   spigelian, 338  
   ventral wall, 338  
 imaging limitations for, 338–345  
 indications for, 337  
 for intussusception, 337–338  
   clinical images of, 341  
 for pancreas, 338  
   clinical images of, 343–344  
 for pyloric stenosis, 337  
   clinical images of, 340  
 for small bowel obstruction, 342  
 for spleen, 338  
   clinical images of, 345
- abdominal aorta, ultrasound for, 280  
 for AAA, 280, 281, 284  
   with CDI, 284, 285  
 diagnostic capabilities of, 280
- dissection of, 285  
   with CDI, 285  
 of enlarged iliac arteries, 281  
 imaging limitations of, 280  
 indications for, 280  
 normal view of, 280–281  
 for saccular aneurysm, 284  
 for thrombus, in inferior vena cava, 285
- abdominal aortic aneurysm (AAA), 280,  
 281, 284  
   under angiography, with CT, 491–493  
   with CDI, 284, 285  
   under MRI, 574–575  
   resuscitation ultrasound for, 389–390
- abscesses  
 biliary ultrasound for, 218  
 of brain, under MRI, 532–533  
 DVT and, 253  
 epidural, 549  
 hepatic, 477  
 peritonsillar, 360–361  
   diagnostic capabilities of, 360–361  
   imaging for, 361, 362, 363, 364–365  
   indications for, 360
- AC. *See* acromio-clavicular separation;  
 acromio-clavicular view
- ACA. *See* American Cardiology Association
- Achilles tendon, MRI for, 626
- acoustic enhancement, 214
- acoustic shadowing, 214
- ACR. *See* American Academy of Radiology
- acromio-clavicular (AC) separation, 4
- acromio-clavicular (AC) view, of shoulder, 4
- AC separation. *See* acromio-clavicular  
 separation
- acute appendicitis. *See* appendicitis, acute
- acute cholangitis. *See* cholangitis, acute
- acute cholecystitis. *See* cholecystitis, acute
- acute pancreatitis. *See* pancreatitis, acute
- acute trauma. *See* trauma, acute
- AC view. *See* acromio-clavicular view
- ADC. *See* analog-to-digital conversion
- adenomyomatosis, 231
- Agency for Health Care Research and  
 Quality, 290
- aging. *See* elderly, plain radiography in
- AHA. *See* American Heart Association
- ALARA. *See* “As Low as Reasonably  
 Achievable”
- American Academy of Radiology (ACR),  
 560  
   abdomen MRI guidelines under, 569
- American Cardiology Association (ACA),  
 561
- American College of Obstetrics and  
 Gynecology, 402
- American Heart Association (AHA), 498
- cMRI guidelines for, 561
- American Stroke Association, 498
- analog-to-digital conversion (ADC), 519
- angiography. *See also* digital subtraction  
 angiography; magnetic resonance  
 angiography  
 MRI with, 497, 506
- angiography, with CT, 482–485. *See also*  
 abdomen-pelvis angiography,  
 with CT; head and neck  
 angiography, with CT  
 for abdomen-pelvis, 489–496  
   for AAA, 491–493  
   for aorto-iliac system, 489  
   clinical images of, 490–496  
   contrast allergy in, 489–490  
   diagnostic capabilities of, 489  
   dye infiltration and, 490  
   imaging limitations of, 489–490  
   indications for, 489  
   for mesenteric vessels, 489, 494–495  
   for pneumatosis coli, 496  
   pregnancy risks with, 490  
   radiation exposure with, 490  
   renal dysfunction from, 490  
   for renal vasculature, 489  
   for splenic arteries, 493–494, 495–496  
   for venous thromboembolism, 489  
 for aortic dissection, 482, 484  
 catheter angiography v., 497  
 clinical images of, 483–485  
 for coronary disease, 482  
 diagnostic capabilities of, 482  
 for extremities  
   diagnostic capabilities of, 506  
   imaging limitations of, 506  
   indications for, 506  
   MRA v., 506
- of extremities, 506  
   clinical images of, 507–509, 510, 511,  
   513  
 for head and neck, 497–500  
   for cerebrovascular injury, 501, 502  
   for cervicocranial vascular disease, 501  
   contrast materials in, 503  
   diagnostic capabilities of, 499–500  
   imaging limitations of, 500  
   indications for, 498–499  
   for thrombolytic therapy, 503  
 imaging limitations of, 482  
 indications for, 482  
 MRA v., 497  
 for pneumothorax, 485  
 for pulmonary embolism, 482, 485
- angular momentum, 517
- ankles  
 MRI for, 624–629  
   for Achilles tendon, 626  
   for inversion injuries, 626  
   for tenosynovitis, 627  
   for ulcers, 629
- plain radiography of, 31–33  
 dislocation of, 35  
 fractures, 31, 32, 33  
 twisting injuries in, 32
- anterior-posterior (AP) view  
 of cervical spine, 94  
 of elbow/forearm, 7  
 of shoulder, 4
- anterior subluxation (AS), 99  
 with perched facets, 100, 101

- aorta, CXR for, 131, 143–146. *See also*  
 abdominal aorta, ultrasound for  
 dissection of, 143  
 esophageal coin in, 144  
 tracheal deviation in, 145  
 vascular rings in, 144–145
- aortic dissection  
 angiography of, with CT, 482, 484  
 cMRI for, 561–562, 564  
 CXR for, 143  
 with MRI, in abdomen, 575
- apical oblique view, of shoulder, 4
- appendicitis, acute, 72  
 under abdomen-pelvis CT, 477  
 abdominal ultrasound for, 337  
 clinical images of, 338–339  
 indications for, 160  
 appendicoliths as, 160, 163  
 gas distribution as, 164  
 MRI for, 570  
 pediatric abdomen radiography for,  
 160–164  
 resuscitation ultrasound for, 391  
 “ring of fire” in, 339
- appendicoliths, 160, 163
- appendix, 338  
 inflamed, 339
- AP view. *See* anterior-posterior view
- array transducers, 212–213, 216  
 phased, 213
- arthritis. *See* osteoarthritis; rheumatoid  
 arthritis; septic arthritis of the hip
- arthrocentesis, 354  
 in elbow,
- AS. *See* anterior subluxation
- asbestosis, 194
- ascites, 581
- “As Low as Reasonably Achievable”  
 (ALARA), 217
- atelectasis, 132, 195
- atherosclerosis, ischemic stroke from, 498
- atlantodens interval, 95  
 increase in, 98
- attenuation, 213–214
- avascular necrosis, 15, 19
- axillary view, of shoulder, 4
- Baker’s Cyst, 252  
 in knee, 620
- Bankart fractures, 4, 6
- barium studies  
 for mediastinum, with CXR, 150  
 for midgut volvulus, 158
- bedside ultrasound, 207  
 applications of, 203  
 archiving for, 205, 206  
 for images, 206  
 billing for, 205–206, 207  
 equipment care for, 206  
 machines for, 203–204  
 controls for, 204  
 costs for, 203–204  
 Doppler applications in, 205,  
 211–212
- options for, 204–205  
 size of, 204  
 policy of use for, 205  
 privileging for, 205, 206  
 quality improvement for, 206  
 result reporting for, 205  
 technicians for, 204  
 training guidelines for, 205  
 CME in, 206–207  
 troubleshooting for difficulties with,  
 207  
 use demographics for, 203
- berry aneurysm, 530
- bile ducts  
 gallstones and, 235  
 structure of, 231, 235  
 CHD in, 231
- biliary ultrasound, 218–235  
 for abscesses, 218  
 ALARA for, 217  
 of bile ducts, 231–235  
 gallstones and, 235  
 structure of, 231, 235  
 biologic effects of, 217  
 of cholecystitis, 214, 216  
 cholescintigraphy and, 218  
 data analysis for, 211  
 diagnostic capabilities of, 218  
 Doppler applications of, 205, 211–212  
 CDI, 205, 211, 212  
 Power Flow, 205, 211–212  
 SDI, 212  
 FAST with, 217  
 for foreign body wounds, 3  
 frequency in, 210  
 of gallbladder, 214, 215, 216, 219–231  
 for adenomyomatosis, 231  
 for carcinoma, 230  
 for cholecystitis, 225–227, 228  
 for porcelain gallbladder, 230  
 imaging limitations of, 218–219  
 indications for, 218  
 of intrauterine pregnancy, 215  
 of median nerve block, 216  
 MI in, 211  
 M-mode, 212  
 physics of, 217  
 principles of, 209  
 for soft tissue pathology, 3  
 system controls for, 209–212  
 acoustic power, 211  
 depth, 211  
 distance measurement, 211  
 gain, 210  
 resolution, 210–211  
 TGC, 209–210  
 zoom function as, 211  
 TI in, 211  
 transducer selection in, 212–213  
 array, 212–213, 216  
 mechanical, 212  
 of urinary bladder, 215, 217
- bladder. *See* urinary bladder, ultrasound for
- bladder stones, 86
- Bloch, Felix, 518
- bone cell tumors, 22
- bone marrow, MRI for  
 abnormalities, 539  
 edema and, 586
- bones. *See also* musculoskeletal system  
 chest CT for, 468–470  
 for fractures, 468–470  
 MRI for, osteocrosis in, 612  
 ultrasound for, 349  
 for other long bones, 351–353  
 for small bones, 353
- bowel distention, 169. *See also* gas  
 distribution
- bowel obstruction, CT for, 476
- bowel obstruction, plain radiography for,  
 66  
 gas distribution in, 155–157  
 ileus v., 153–155  
 intussusception and, 165–166  
 in large intestines, 75–76  
 by malrotation, 158–160  
 testing for, 159–160  
 in midgut volvulus, 157–160  
 definition of, 157  
 in infants, 158  
 Ogilvie’s syndrome as, 78  
 pediatric, 153–157  
 in small intestines, 71
- bowel obstruction, ultrasound for  
 with resuscitation, 391  
 for small bowels, 342
- Boxer’s fracture, 9, 13
- brain, MRI of, 521–522  
 clinical images of, 522–536  
 of berry aneurysm, 530  
 of brain abscesses, 532–533  
 of cerebral infarct, 528, 529  
 of dural sinus thrombosis,  
 530–531  
 of encephalitis, 532  
 of foreign bodies, 536  
 of frontoparietal lobe metastasis,  
 536  
 of masses, 535  
 of meningiomas, 535  
 of multiple sclerosis, 534  
 of neurocysticercosis, 533  
 of neurosarcoidosis, 534  
 of retinal hemorrhage, 536  
 of SAH, 529  
 of stroke distribution, 528  
 of subdural hematomas, 530  
 of thalamus infarct, 528–529  
 diagnostic capabilities of, 522  
 imaging limitations of, 522  
 indications for, 522
- British National Institute for Clinical  
 Excellence, 290
- bucket-handle fractures, 177  
 of humerus, 177
- buckle fractures, 120
- bursitis, 6
- burst fractures, 101

- calcaneal fractures, 36  
 CA-MRSA. *See* community acquired methicillin resistant *Staphylococcus aureus*  
 Canadian C-spine Rule (CCR), 92  
 cancers. *See* carcinomas, ultrasound for;  
   colon cancer; gastric cancer;  
   hepatocellular carcinoma;  
   neoplasms, in liver; pancreatic  
   cancer; prostate cancer; renal cell  
   carcinoma; uterine cancer  
 carcinomas, ultrasound for  
   in gallbladder, 230  
   in kidneys, 269, 276  
   in urinary bladder, 277  
 cardiac magnetic resonance imaging  
   (cMRI), 560–562, 563–566  
   ACA/AHA guidelines for, 561  
   ACR guidelines for, 560  
   advantages of, 560–561  
   for aortic dissection, 561–562, 564  
   for cardiomyopathy, 566  
   clinical images of, 563–566  
   for coarctation, 565  
   DE-cMRI and, 562  
   diagnostic capabilities of, 561, 562  
   with PIOPED II, 562  
   imaging limitations for, 562  
   contrast agents and, 562  
   pacemakers and, 562  
   indications for, 560–561  
   pregnancy risks and, 560  
   for pulmonary embolism,  
   560, 566  
   for myocardial infarction, 565  
   NFD and, 562  
 cardiac ultrasound, emergency, 254–256  
   apical views in, 258, 260, 261, 263  
   CDI in, 262, 265  
   consultant v. physician performed,  
   254–255  
   diagnostic capabilities of, 254–255  
   echo in, 254  
   effusion in, 255  
   experience recommendations for use of,  
   255  
   global LVF in, 255  
   EF in, 255  
   imaging modalities for, 255–256  
   indicators for, 255–256  
   limitations of, 256  
   probe selection and, 256  
   scanner orientation and, 255  
   velocity in, 262  
   view angles and, 256, 257–258  
   indications for, 254  
   parasternal axis views in, 257–258, 259,  
   260, 261, 262–265  
   of aortic valve, 257–258  
   for elderly, 265  
   of mitral valve, 258  
   of papillary muscles, 258  
   for PE, 254  
   right ventricular strain in, 255  
   subxiphoid view in, 259, 260, 261, 262  
   TTE v. TEE, 255  
 cardiogenic hypotension, etiologies for,  
   367–368  
 cardiomeastinum, CXR for, 46  
   wide silhouette for, 57  
 cardiomegaly, 52, 141–142  
 cardiomyopathy, 374–375  
   cMRI, 566  
   dilated, 376  
   fluid status with, 381  
 cardiothoracic disease, etiologies for  
   for cardiomyopathy, 374–375, 376  
   fluid status with, 381  
   for hypervolemia, 379  
   for myocardial infarction, 376  
   for PE, 375  
   for pneumonia, 377  
   for pulmonary embolism, 378  
 cardiothoracic disease, etiologies of, 368–369  
   for abdominal diseases, 368  
   for cardiogenic hypotension, 367–368  
   for dyspnea, 369  
   for pericardial effusion, 372–373, 374  
 carpal tunnel disease, 9  
 catheter angiography, 497  
 CCR. *See* Canadian C-spine Rule (CCR)  
 CDI. *See* Color Doppler Imaging  
 cecal volvulus, 73  
 cellulitis, 252  
 central venous catheters (CVC), in  
   ultrasound, 290–293  
   anatomic considerations for, 290  
   background of, 290  
   clinical images of, 291–292, 293  
   of neck anatomy, 291  
   of provider techniques, 292  
   procedures of, 290  
   pitfalls with, 291  
 cerebral contusion, 432  
 cerebrospinal fluid (CSF), 299  
 cervical hyperostosis, 183  
 cervical spine. *See also* cervical spine  
   injuries; cervical spine, plain  
   radiography of  
   AP view of, 94  
   atlantoaxial subluxation in, 96  
   atlantodens interval in, 95  
   increase in, 98  
   extension/flexion view of, 96  
   for gunshot wounds, 103  
   ligamentous anatomy of, 93  
   of cervicocranium, 94  
   lines of lordosis in, 94  
   under MRI, 540  
   for non-traumatic conditions, 104  
   occipitoatlantal articulation in, 95  
   odontoid view of, 96  
   prevertebral soft tissue in, 97  
   Swimmer's view of, 97  
 cervical spine injuries  
   AS as, 99, 100, 101  
   clinically insignificant, 92  
   dislocations, 100  
   fractures, 101–102  
   burst, 101  
   Clay Shoveler's, 102  
   comminuted compression, 102  
   Hangman's fracture, 99  
   isolated, 98  
   odontoid, 98  
   pediatric, 93  
   SCIWORA and, 93  
 cervical spine, plain radiography of, 91–93  
   CT v., 404  
   diagnostic applications of, demographic  
   data for, 91–92, 93  
   limitations of, 93  
   for fractures, 98, 99, 101–102  
   indications for, 92–93  
   with CCR, 92  
   with NLC, 92  
   pediatrics and, 93  
   SCIWORA and, 93  
 cervical vertical body destruction, 183  
 cervicocranial vascular disease, 501  
 CFV. *See* common femoral vein  
 CHD. *See* common hepatic duct  
 chest, CT of, 457–470  
   for bone, 468–470  
   for fractures, 468–470  
   diagnostic capabilities of, 457  
   imaging limitations of, 457–458  
   indications for, 457  
   for lung parenchyma, 459–461  
   contusions in, 459  
   lacerations in, 460  
   for pneumonia, 461  
   for mediastinum, 464–467  
   for aortic tear, 465  
   for diaphragmatic ruptures, 467  
   for esophageal ruptures, 466  
   for pericardial effusion, 465  
   for pneumomediastinum, 464  
   for tracheobronchial injuries, 466  
   for pleural space, 461–463  
   empyema in, 463  
   exudates/transudates in, 463  
   hemothorax in, 462  
   pneumothorax in, 461, 462  
 chest radiography (CXR), with plain film,  
   45–62, 152. *See also* lungs, CXR for  
   of aorta, 131, 143–146  
   dissection of, 143  
   esophageal coin in, 144  
   tracheal deviation in, 145  
   vascular rings in, 144–145  
   for bones, 131, 151–152  
   for discitis, 151  
   with osteogenesis imperfecta, 151  
   for cardiomegaly, 52  
   clinical imaging for, 131–152  
   for airway, 46  
   for bones, 46  
   for cardiomeastinum, 46, 57  
   for diaphragm, 46  
   for COPD, 51  
   diagnostic capabilities of, 45, 130



- for elderly, 181, 194–196, 231
    - for aortic aneurysm, 194
    - for asbestosis, 194
    - for atelectasis, 195
    - for pulmonary nodules, 196
  - for focal pneumonia, 49
  - for fractures
    - of ribs, 61
    - scapular, 61
  - for free air, 59
  - for heart, 131, 141
    - for cardiomegaly, 141–142
    - for infants, 142
    - for Kawasaki disease, 142
    - for tension pneumothorax, 143
  - imaging limitations of, 45, 130
  - indications for, 45, 130
  - for infants, 48, 138–141
    - for diaphragmatic hernias, 140
    - for heart, 142
    - mediastinum in, 144–149
    - for PIE, 140
    - for RDS, 138, 139
    - for tuberculosis, 135
  - intubation and, 57
  - for lungs, 46, 131–136
    - edema in, 52, 134
    - for foreign bodies in, 136–137
    - PE in, 62, 63
    - pulmonary contusion in, 60
  - for masses/nodules, 58
  - for mediastinum, 131, 146–150
    - with barium study, 150
    - cardiomediastinum, 46, 57
    - for diGeorge syndrome, 148
    - in infants, 144–149
    - pneumomediastinum, 60, 146–147
  - normal views of, 48
    - anteroposterior, 48
    - apical, 48
    - in supine patients, 47
  - for PCP, 59
  - for pediatric infiltrates, 50
  - for pleural effusion/hemothorax, 55–56
  - for pneumomediastinum, 60
  - of pneumothorax, 53
  - for subcutaneous emphysema, 60
  - for tuberculosis, 54
- Chilaiditi loops, 79
- child abuse, plain radiography for, 176–179
  - diagnostic capabilities for, 176
  - for fractures, 177–179
    - bucket-handle, 177
    - metaphyseal, 177
    - rib, 178
    - skull, 178–179
    - toddler's, 179
  - indications for, 176
  - for subdural hematomas, 179
- children. *See also* cervical spine injuries, pediatric; infants, CXR for; pediatric extremities, plain radiography for; pediatric infiltrates
- bronchial foreign bodies and, 136–137
- choking. *See* foreign bodies, ultrasound for
- cholangitis, acute, MRI for, 568
- cholecystitis, acute, 225–227, 228
  - under abdomen-pelvis CT, 477–478
  - emphysematous, 229
  - MRI for, 568
  - pericholecystic fluid and, 226
  - resuscitation ultrasound for, 391–392
  - ultrasound of, 214, 216
- choledocholithiasis, MRI for, 580
- cholelithiasis MRI of, 579
- cholescintigraphy, 218
- chondrocalcinosis of the knee, 199
- chronic obstructive pulmonary disease (COPD), 51
- clavicle fractures, 4
  - clinical images of, 352, 354, 468
- clavicles, fractures of, 352
- Clay Shoveler's fracture, 102, 408
- CME. *See* continuing medical education, for ultrasound
- cmMRI. *See* cardiac magnetic resonance imaging
- coarctation, 565
- Colles fractures
  - AP, 9, 10
  - lateral, 9, 10
- colon cancer, 192
- Color Doppler Imaging (CDI), 205, 211, 212
  - for AAA, 284, 285
  - for aortic dissection, 285
  - in cardiac ultrasound, 262, 265
  - with testicular ultrasound, 330, 332
  - in Triplex ultrasound, 330
- common femoral vein (CFV), 247
- common hepatic duct (CHD), 231
- community acquired methicillin resistant *Staphylococcus aureus* (CA-MRSA), 358
- compression fractures
  - in cervical spine injuries, 102
  - in elderly, 182, 186
  - in thoracolumbar spine, 108, 110
- computed tomography (CT). *See also* abdomen-pelvis, CT for; angiography, with CT; chest, CT of; extremities angiography, with CT; face, CT imaging of; head and neck angiography, with CT; head, CT for; radiographic contrast induced nephropathy; spinal trauma, CT for
- of abdomen-pelvis, 473–474
  - clinical images of, 474–475, 476, 477–479, 480, 481
  - diagnostic capabilities for, 473–474
  - imaging limitations for, 474
  - indications for, 473
- with abdominal-pelvic angiography, 489–496
  - for aorto-iliac system, 489
  - clinical images of, 490–496
  - contrast allergy in, 489–490
  - diagnostic capabilities of, 489
  - dye infiltration and, 490
- imaging limitations of, 489–490
- indications for, 489
- for mesenteric vessels, 489, 494–495
- or AAA, 491–493
- for pneumatosis coli, 496
- pregnancy risks with, 490
- radiation exposure with, 490
- renal dysfunction from, 490
- for renal vasculature, 489
- for splenic arteries, 493–494, 495–496
- for venous thromboembolism, 489
- of chest, 457–470
  - for bone, 468–470
  - diagnostic capabilities of, 457
  - imaging limitations of, 457–458
  - indications for, 457
  - for lung parenchyma, 459–461
  - for mediastinum, 464–467
  - for pleural space, 461–463
- with extremities angiography, 506
- clinical images of, 507–509, 510, 511, 513
  - diagnostic capabilities of, 506
  - imaging limitations of, 506
  - indications for, 506
  - MRA v., 506
- of face, 438–441
  - anatomy analysis in, 439
  - for Le Fort fractures, 440–441
  - for mandible, fractures to, 441
  - for maxilla, fractures to, 440–441
  - methods of, 438
  - for orbital blow-out fractures, 439–440
  - screening for, 438
  - for zygoma, fractures of, 440
- for foreign body wounds, 3
- for head, 420–436
  - for cerebral contusion, 432
  - clinical images of, 429–431, 432
  - diagnostic capabilities of, 420–422
  - for gunshot wounds, 432
  - for hemorrhaging, 432, 433–434
  - for herniation, 434
  - imaging limitations for, 422
  - indications for, 420, 421
  - for ischemic stroke, 422, 435
  - for lesions, 436
  - principles of, 422–424
  - for skull fractures, 420
- with head and neck angiography, 497–500
  - for cerebrovascular injury, 501, 502
  - for cervicocranial vascular disease, 501
  - contrast materials in, 503
  - diagnostic capabilities of, 499–500
  - imaging limitations of, 500
  - indications for, 498–499
  - for thrombolytic therapy, 503
- HRCT, 457
- MDCT, 457, 473, 474, 497
- during pregnancy, 402
  - fetal radiation exposure, 402
- radiation dosing levels in, 402
- RCIN from, 399–402

- computed tomography (*Continued*)  
 allergic/anaphylactoid reactions as part of, 400–402  
 contrast osmolality and, 400  
 creatine clearance measurements in, 399  
 pre-treatment guidelines for, 401  
 prevention of, 400–402  
 risk factors for, 399, 400  
 for soft tissue pathology, 3  
 for spinal trauma, 404–406  
   cervical, 93  
   clinical images of, 406–408, 409, 415, 416, 417, 419  
   diagnostic capabilities of, 405  
   disadvantages of, 405–406  
   indications for, 404–405  
   MRI v., 404–405  
   pain as symptom of, 404, 412, 418  
   plain radiography v., 404  
 with thoracic angiography, 482–485  
   for aortic dissection, 482, 484  
   clinical images of, 483–485  
   for coronary disease, 482  
   diagnostic capabilities of, 482  
   imaging limitations of, 482  
   indications for, 482  
   for pneumothorax, 485  
   for pulmonary embolism, 482, 485  
 continuing medical education (CME), for ultrasound, 206–207  
 COPD. *See* chronic obstructive pulmonary disease  
 coronary disease, 482  
 CSF. *See* cerebrospinal fluid  
 CT. *See* computed tomography  
 CTA. *See* angiography, with CT  
 CVC. *See* central venous catheters, in ultrasound  
 CXR. *See* chest radiography, with plain film  
 cysts/masses  
   in brain, under MRI, 535  
   hepatic, 582  
   nabothian, 320  
   pancreatic, 583  
   pseudocysts, in pancreas, 344  
   renal, 269, 275, 575  
   synovial, 548  
 Dancer's fracture, 37  
 DE-cMRI. *See* delayed enhancement cardiac magnetic resonance imaging  
 deep venous thrombosis (DVT), ultrasound for, 247  
   abscesses and, 253  
   Baker's Cyst and, 252  
   cellulitis and, 252  
   development of, 246  
   diagnostic capabilities of, 246–247  
   femoral vessels under, 249  
     CFV, 247  
     chronic condition of, 252  
     SFV, 247  
   imaging limitations with, 247  
   indications for, 246  
   probe placement for, 248  
   proximal, 251  
   PV and, 247, 250, 251  
   risk factors for, 246  
   SDI in, 250–251  
   techniques for, 247  
 degenerative joint disease (DJD), 181, 187, 189  
   of knee, 200  
 delayed enhancement cardiac magnetic resonance imaging (DE-cMRI), 562  
 dens fractures, 184, 408  
 diabetes mellitus, 400  
 diffuse idiopathic skeletal hyperostosis (DISH), 181, 185  
 diGeorge syndrome, 148  
 digital subtraction angiography (DSA), 497  
 disc extrusions, 546, 548  
 discitis, 151  
 DISH. *See* diffuse idiopathic skeletal hyperostosis  
 dislocations  
   cervical spine injuries from, 100  
   in elbow/forearm  
     common, 7  
     Monteggia fractures as, 7, 8  
     MRI for, 597  
   in hand/wrist injuries  
     interphalangeal dislocation, 3  
     lunate, 9, 11–12  
     perilunate, 9, 12  
   of hip/pelvis, 113  
   of knees, 619  
   in lower extremities  
     of ankles, 35  
     of knee, 24  
   in shoulder  
     anterior, 4, 5  
     luxatio erectae, 4, 5  
     MRI for, 590, 591  
     posterior, 4, 5  
 distal radius, 244  
 diverticulitis, 476  
 DJD. *See* degenerative joint disease  
 Doppler applications, in ultrasound, 205, 211–212  
   CDI, 205, 211, 212  
   PowerFlow, 205, 211–212  
   SDI, 212  
 DSA. *See* digital subtraction angiography  
 dural sinus thrombosis, 530–531  
 DVT. *See* deep venous thrombosis, ultrasound for  
 dyspnea, etiologies for, 369  
 echo, 254  
 echocardiography. *See* cardiac ultrasound, emergency  
 ectopic pregnancy, 382  
 edema  
   in bone marrow, 586  
   in lungs, 52, 134  
   peritonsillar, 362  
   in wrist, 601–602  
 EF. *See* ejection fraction  
 effusion, in cardiac ultrasound, 255  
 ejection fraction (EF), 255  
 elbow/forearm  
   arthrocentesis in,  
   effusions in, 355–356  
   clinical images of, 356  
   MRI for, 594–599  
     for dislocations, 597  
     for tears, 595–596  
 elbow/forearm, plain radiography for, 6–8  
   AP view of, 7  
   diagnostic capabilities of, 7  
   dislocations in  
     common, 7  
     with epicondylar fracture, 125  
   Monteggia fractures as, 7, 8  
   fractures in, 120, 125  
   Galeazzi fractures in, 7, 8  
   for “golfer's elbow,” 6  
   imaging limitations for, 7  
   indications for, 6  
   lateral view of, 7  
   posterior fat pad in, 7  
   radial head fractures in, 7  
   supplementary views of, 7  
   for “tennis elbow,” 6  
 elderly, plain radiography in, 200  
   for abdominal imaging, 181, 193  
     for feeding tube placement, 193  
     for hiatal hernias, 193  
   with cardiac ultrasound, 265  
   for CXR, 181, 194–196, 231  
     for aortic aneurysm, 194  
     for asbestosis, 194  
     for atelectasis, 195  
     for pulmonary nodules, 196  
   diagnostic capabilities for, 180  
   for extremity imaging, 181, 197–200  
     for chondrocalcinosis of the knee, 199  
     for DJD, 200  
     for fractures, 197  
     for osteoarthritis, 197–198  
   imaging limitations for, 181  
   indications for, 180  
   for pelvic imaging, 181, 191–192  
     for bone metastases, 192  
     for colon cancer, 192  
     for Paget disease, 191  
   for rheumatologic conditions, 181, 197–200  
   for spine imaging, 180–181, 182–191  
     for annular calcification, 190  
     for cervical hyperostosis, 183  
     for cervical vertical body destruction, 183  
   for dens fracture, 184  
   for DISH, 181, 185  
   for DJD, 181, 187, 189  
   for fractures, 180–181, 182, 186  
   for lumbar region, 187–189  
   for Schmorl's nodule, 190  
   for spondylolisthesis, 188  
   for tumors, 181

- emergency cardiac ultrasound. *See* cardiac ultrasound, emergency
- emergency radiology. *See* cardiac ultrasound, emergency; renal ultrasound, emergency
- emergency renal ultrasound. *See* renal ultrasound, emergency
- emphysema, subcutaneous, 60
- emphysematous cholecystitis, 229
- empyema, 463
- EMS. *See* endometrial stripe
- encephalitis, 532
- endometrial stripe (EMS), 314
- EUG and, 319
- enostosis, 419
- ependymomas, spinal MRI for, 555
- epicondylar fractures, 124–125, 126
- elbow/forearm dislocations with, 125
- epicondylitis, 6
- epididymitis, 333
- epidural abscesses, 549
- epidural hematomas, 429
- esophageal coin, 144
- EUG. *See* extrauterine gestation
- extrauterine gestation (EUG), 317–320
- EMS and, 319
- extremities. *See* elbow/forearm; extremities, MRI of; hips; lower extremities, plain radiography for; pediatric extremities, plain radiography for; shoulder; upper extremities, plain radiography for; wrist
- extremities angiography, with CT, 506
- clinical images of, 507–513
- for gunshot wounds, 508–509, 510, 511, 513
- diagnostic capabilities of, 506
- imaging limitations of, 506
- indications for, 506
- MRA v., 506
- extremities, MRI of, 586–587. *See also* ankles; elbow/forearm; hips; knees; shoulder; wrist
- clinical images for, 588–599, 607–612, 631
- of ankles, 624–629
- of elbow/forearm, 594–599
- of hips, 607–612
- of knee, 613–624
- of shoulder, 588–593
- of toes, 630–631
- of wrist, 600–606
- diagnostic capabilities of, 587
- for trauma, 587
- imaging limitations for, 587
- indications for, 586–587
- exudates/transudates, 463
- face, CT imaging of, 438–441
- anatomy analysis in, 439
- facial buttress system in, 439
- for Le Fort fractures, 440–441
- for mandible, fractures to, 441
- diagnostic capabilities of, 441
- imaging limitations of, 441
- indications for, 441
- diagnostic capabilities of, 440–441
- imaging limitations of, 441
- indications for, 440
- methods of, 438
- for orbital blow-out fractures, 439–440
- diagnostic capabilities of, 439
- imaging limitations of, 439–440
- indications for, 439
- theories of, for mechanical mechanism of, 439
- screening for, 438
- for zygoma, fractures of, 440
- diagnostic capabilities of, 440
- imaging limitations for, 440
- indications for, 440
- facial buttress system, 439
- fall on an outstretched hand (FOOSH)
- injury, 9
- FAST. *See* Focused Assessment with Sonography in Trauma
- feeding tubes
- in elderly, placement of, 193
- replacement of, 90
- feet, plain radiography of, 16
- foreign bodies in, 41–42
- fractures in, 37–40
- calcaneal, 36
- dancer's, 37
- Jones, 38
- Lisfranc, 39–40
- metatarsal stress, 39
- gout in, 43
- growth plates in, 42
- osteomyelitis in, 42
- rheumatoid arthritis in, 43
- soft tissue gas in, 41
- femoral fractures, 20, 23
- femoral hernias, 338
- femur, 351
- clinical images of, 351
- fibroids, 321
- submucosal, 321
- fibular fractures, 30
- fluid collection. *See* peritoneal fluid collections, plain radiography for
- focal pneumonia, 49
- Focused Assessment with Sonography in Trauma (FAST), 217
- ultrasound and, 236, 237, 238, 239
- FOOSH injury. *See* fall on an outstretched hand injury
- forearms. *See* elbow/forearm, plain radiography for
- foreign bodies, ultrasound for. *See also* wounds, by foreign bodies
- guided procedures for, 294, 295
- anatomic considerations in, 294
- clinical images of, 295
- indications for, 294
- pitfalls of, 294
- in lungs, 136–137
- in pediatric abdomen, 169–171
- of ingested materials, 171
- metallic, 169–171
- in soft tissues, 359–360
- diagnostic capabilities of, 359–360
- imaging for, 360, 363–364
- indications for, 359
- fractures. *See also* clavicle fractures; mandible fractures, under CT; maxilla fractures, under CT; orbital blow-out fractures; rib/sternum, fractures of; Salter-Harris fractures; skull fractures; zygoma fractures, under CT
- Bankart, 4, 6
- Boxer's, 9, 13
- in cervical spine, 101–102
- burst fractures, 101
- Clay Shoveler's fracture, 102
- comminuted compression, 102
- den's fracture, 408
- Hangman's fracture, 99, 408
- isolated, 98
- Jefferson's fracture, 409
- odontoid fractures, 98
- from child abuse, 177–179
- bucket-handle, 177
- metaphyseal, 177
- rib, 178
- skull, 178–179
- clavicle, 4
- Colles, 9, 10
- with CT
- in abdomen-pelvis, 481
- in chest, 468–470
- in head, 429
- Le Fort fractures, 440–441
- for mandible fractures, 441
- for maxilla fractures, 440–441
- orbital blow-out fractures, 439–440
- sternal fractures, 470
- vertebral fractures, 470
- of zygoma, 440
- with CXR
- of ribs, 61
- scapular, 61
- elderly plain radiography and, 180–181, 197
- for compression fractures, 182, 186
- for Dens fractures, 184
- Galeazzi, 7, 8
- Hill-Sachs deformity, 4, 6
- Hoffa, 23
- imaging limitations of plain radiography for, 15
- in lower extremities
- acetabular fracture, 18
- ankles, 31, 32, 33
- feet, 36, 37–40
- femoral fractures, 20, 23
- fibular, 30
- hip, 17
- tibial, 25, 26, 30, 34
- trochanter, 20–21

- fractures. (*Continued*)  
  with MRI  
    for hips, 607–609, 612  
    for shoulder, 593  
    for spinal trauma, 542, 543–546  
    for wrist, 603  
  in pediatric extremities  
    buckle fractures, 120  
    in elbow/forearm, 120  
    epicondylar fractures, 124–125, 126  
    Galeazzi fractures, 124  
    Greenstick fractures, 120  
    hip avulsion fractures, 128  
    humeral/radiocapitellar, 121  
    Monteggia fractures, 123  
    physeal fractures, 117  
    Salter-Harris fractures, 118–119  
    supracondylar fractures, 122–123  
  radial head, in elbow/forearm, 7  
  scaphoid, 9  
  Smith's, 9, 10  
  in thoracolumbar spine, 111–115  
    compression fractures, 108, 110  
    endplate fractures, 108, 109  
    with retropulsion, 109  
  toddler's, 30, 127  
  Tuft, 9, 13  
  ultrasound for, 350–353  
    for clavicles, 352, 354  
    evaluation of, 350  
    for femur, 351  
    for hematomas, 350  
    for hips, 354, 355  
    for humerus, 4, 6, 350  
    for joints, 349  
    for occult fractures, 353  
    for other long bones, 351–353  
    for reduction of, 353–355  
    for rib/sternum, 352–353, 354  
    for scaphoid fractures, 355  
    for small bones, 353  
  free air, plain radiography for, 59  
    in abdomen, 69  
    retroperitoneal, 80  
  free fluid (FF), in uterus, 323  
    in pouch of Douglas, 323  
    in uterovesicular pouch, 323  
  
Galeazzi fractures  
  AP, 7, 8  
  lateral, 7, 8  
  in pediatric extremities, 124  
gallbladder. *See also* porcelain gallbladder  
  biliary ultrasound of, 214, 215, 216, 219–231  
    for carcinoma, 230  
    for cholecystitis, 225–227, 228  
    for porcelain gallbladder, 230  
  distention of, 228  
  gallstones and, 221–222  
  resuscitation ultrasound of, 391–392  
    for acute cholecystitis, 391–392  
    for pneumonia, 392  
  sludge in, 224  
    structure of, 219–221  
      MLF in, 219  
  gallstones, 221–222  
    bile ducts and, 235  
  Gamekeeper's thumb, 604  
  gas distribution, 155–157  
    appendicitis and, 164  
    in infants, 157  
    with intussusception, 166, 169  
  gastric cancer, spinal trauma MRI for, 553  
  gastrointestinal tract. *See* abdomen-pelvis, CT for; abdomen-pelvis, ultrasound for; abdomen, plain radiography for; appendix; bowel obstruction, plain radiography for; bowel obstruction, ultrasound for; gallbladder; ileus, plain radiography for; pancreas; spleen; urinary bladder, ultrasound for; urinary tract, ultrasound for; volvulus  
  global left ventricular function (LVF), 255  
    EF in, 255  
    “golfer's elbow,” 6  
  gout, 43  
  grayscale ultrasound, 330  
    in Triplex ultrasound, 330  
  Greenstick fractures, 120  
  gunshot wounds, 103, 432  
    extremities angiography for, with CT, 508–509, 510, 511, 513  
  
hand/wrist injuries, plain radiography for, 9  
  for acute trauma to, 9  
  Boxer's fracture, 9, 13  
  carpal tunnel disease, 9  
  Colles fractures as, 9, 10  
  diagnostic capabilities of, 9  
  dislocations  
    interphalangeal, 3  
    lunate, 9, 11–12  
    perilunate, 9, 12  
  FOOSH, 9  
  imaging limitations for, 9  
  indications for, 9  
  Mallet finger, 9  
  scaphoid fractures, 9, 11  
  scapho-lunate disassociation, 9, 11  
  Smith's fracture, 9, 10  
  Tuft fracture, 9, 13  
  Hangman's fracture, 99  
    under CT, 408  
  head and neck angiography, with CT, 497–500  
    for cerebrovascular injury, 501, 502  
    for cervicocranial vascular disease, 501  
    contrast materials in, 503  
    diagnostic capabilities of, 499–500  
      for hemorrhagic stroke, 499–500, 502  
      for ischemic stroke, 499–500, 502  
      for trauma, 500  
    imaging limitations of, 500  
      for stroke, 500  
      for trauma, 500  
    indications for, 498–499  
      for carotid/artery dissection, 499, 501  
      for hemorrhagic stroke, 498–499  
      for ischemic stroke, 498–499  
      for trauma, 499  
      for thrombolytic therapy, 503  
  head, CT for, 420–436  
    for cerebral contusion, 432  
    clinical images of, 429–432  
      of fractures, 429  
      of hematomas, 429–431  
    diagnostic capabilities of, 420–422  
    for gunshot wounds, 432  
    for hemorrhaging, 432, 433–434  
    for herniation, 434  
    imaging limitations for, 422  
    indications for, 420  
      patient evaluation and, 421  
    for ischemic stroke, 422, 435  
    for lesions, 436  
    principles of, 422–424  
      beam hardening artifacts, 423  
      volume hardening artifacts, 423  
      window settings, 422, 458  
    for skull fractures, 420  
  heart attack. *See* myocardial infarction  
  heart, CXR for, 131, 141. *See also* pericardial tamponade; pericardiocentesis, ultrasound for  
    for aorta, 131, 143–146  
    for cardiomegaly, 52, 141  
    for infants, 142  
    for Kawasaki disease, 142  
    for tension pneumothorax, 143  
  hemangiomas, spinal trauma MRI for, 555  
  hematomas, 350  
    epidural, 429  
    in head, CT for, 429–431  
    subdural, 179, 429  
  hemoperitoneum, 240–241  
  hemorrhagic stroke  
    causes of, 498  
    under head and neck angiography, with CT, 498–500  
      assessment of, with, 502  
      risk factors of, 498  
      SAH, 499  
  hemothorax, 55–56, 462  
  hepatic cysts, 582  
  hepatocellular carcinoma, 582  
  hernias  
    abdominal ultrasound for, 338  
    clinical images in, 342  
    femoral, 338  
    incisional, 338  
    inguinal, 338  
    spigelian, 338  
    ventral wall, 338  
  bilateral, 480  
  hiatal, in elderly, 193  
  in infants, 140  
  ventral, 480  
  hiatal hernias, 193  
    under abdomen-pelvis CT, 479



- high resolution computed tomography (HRCT), 457
- Hill-Sachs deformity, 4, 6
- hips
- dislocations/fractures, 17, 21, 113
  - avulsion, 128
  - MRI for, 607–612
  - for fractures, 609
  - for osteocrosis, 612
  - for tears, 610–611
  - ultrasound for, effusions, 354, 355, 356
- Hoffa fractures, 23
- HRCT. *See* high resolution computed tomography
- humerus, 350
- clinical images of, 350
  - humeral head fractures, 4, 6
- hydration therapy, 400
- hydronephrosis, 578
- hydronephrosis, 269, 272–273
- mild, 272
  - moderate, 273
  - resuscitation ultrasound for, 392
  - severe, 273
- hyperflexion sprain. *See* anterior subluxation
- hypertrophic pyloric stenosis, 340
- hypervolemia, 379, 380
- ICP. *See* increased cranial pressure
- ileus, plain radiography for, 66, 70
- bowel obstruction v., 153–155
  - causes of, 66
- image artifacts, for ultrasound, 213–217
- acoustic enhancement, 214
  - acoustic shadowing, 214
  - attenuation, 213–214
  - mirror image, 216
  - refraction, 214
  - reverberation, 215–216
  - scatter, 215
  - side lobes, 216–217
- incarcerated uterus, 324
- incisional hernias, 338
- increased cranial pressure (ICP), 325
- infants, CXR for, 48, 138–141
- for diaphragmatic hernias, 140
  - gas distribution in, 157
  - for heart, 142
  - for PIE, 140
  - with pneumatosis intestinalis, 169
  - for RDS, 138, 139
  - for tuberculosis, 135
- inguinal hernias, 338
- interphalangeal dislocation, 3
- intrauterine pregnancy (IUP), 316
- abnormal, 317
- intussusception, 164–169
- abdominal ultrasound for, 337–338
  - bony abnormalities of pediatric abdomen and, 174
  - bowel obstruction and, 165–166
  - clinical images of, 341
  - crescent/target signs for, 164–165, 166–167
  - gas distribution with, 166, 169
  - indications for, 164
  - inversion injuries, to ankles, 626
  - ischemic stroke, 422, 435
  - causes of, 498
  - under head and neck angiography, with CT, 498–500
  - assessment of, with, 502
  - risk factors of, 498
- IUP. *See* intrauterine pregnancy
- Jefferson's fracture, 409
- joints, ultrasound for, 349
- for effusions, 354–356
  - appearance of, 354
  - for arthrocentesis, 354
  - clinical images of, 354, 356
  - in elbows, 355–356
  - in hips, 354, 355–356
  - in knees, 355–356
- Jones fracture, 38
- Kawasaki disease, 142
- kidneys, emergency ultrasound for, 268–279. *See also* renal ultrasound, emergency
- for acute trauma, 272
  - for carcinomas, 269, 276
  - for horseshoe kidney, 279
  - for hydronephrosis, 269, 272–273
  - mild, 272
  - moderate, 273
  - severe, 273
  - for normal anatomy, 270
  - for renal cysts/masses, 269, 275
  - for renal disease, 275
  - for renal stones, 274
- kidney stones. *See* urolithiasis
- knees
- effusions in, 355–356
  - clinical images of, 355–356
  - MRI for, 613–624
  - for Baker's cyst, 620
  - for dislocations, 619
  - for osseous tumors, 623–624
  - for osteosarcomas, 623
  - for tears, 615–616, 617–618, 622
- plain radiography of, 24, 26–27
- for chondrocalcinosis, 199
  - for DJD, 200
  - fabella in, 28
  - for joint effusions, 27
  - for lipohemarthrosis, 26
  - metal synovitis of, 28
  - for osteoarthritis, 27
- k-space, in MRI, 519
- kyphosis, 416
- laminectomies, spinal MRI for, 558
- lateral view
- of elbow/forearm, 7
  - of shoulder, 4
- Le Fort fractures, 440–441
- lesions, 436
- leukemia, spinal trauma MRI for, 555
- ligaments, ultrasound for, 349
- lipohemarthrosis, 26
- Lisfranc fractures, 39–40
- liver disease, under MRI, 477
- liver, under abdomen-pelvis CT, 477
- lacerations of, 477
  - neoplasms in, 477
- lower extremities, plain radiography for, 15.
- See also* feet, plain radiography of
- of ankles, 31–33
  - for dislocations, 35
  - for twisting injuries, 32
  - of bone cell tumors, 22
  - diagnostic capabilities of, 15
  - for elderly, 181, 197–200
  - for chondrocalcinosis of the knee, 199
  - for DJD, 200
  - for fractures, 197
  - for osteoarthritis, 197–198
- of feet, 16
- foreign bodies in, 41–42
  - for fractures, 36, 37–40
  - gout in, 43
  - growth plates in, 42
  - osteomyelitis in, 42
  - rheumatoid arthritis in, 43
  - soft tissue gases in, 41
- of fibia, 30
- of fractures
- acetabular, 18
  - of ankles, 31, 32, 33
  - femoral, 20, 23
  - fibular, 30
  - imaging limitations for, 15
  - tibial, 25, 26, 30, 34
  - in toddlers, 30
  - trochanter, 20–21
- imaging limitations of, 15
- for osteomyelitis, 15, 29
- indications for, 15
- for avascular necrosis, 15, 19
  - for rheumatoid arthritis, 15
- of knee, 24, 26–27
- fabella in, 28
  - joint effusion of, 27
  - lipohemarthrosis in, 26
  - metal synovitis in, 28
  - osteoarthritis in, 27
- of osteomyelitis, 29
- of osteosarcomas, 29
- of patella, 22–23
- of pelvis, 16
- hip dislocation/fracture, 17, 21
- in toddlers, 30
- LP. *See* lumbar puncture, ultrasound for
- lumbar puncture (LP), ultrasound for, 299–300
- anatomic considerations for, 299
  - clinical images of, 300
  - CSF in, 299
  - pitfalls of, 300
  - procedures for, 299–300

- lumbar spine, under MRI, 541  
 lung parenchyma, 459–461  
   contusions in, 459  
   lacerations in, 460  
   for pneumonia, 461  
 lungs, CXR for, 46, 131–136  
   air trapping in, 137–138  
   atelectasis, 132  
   bilateral infiltrates in, 131, 132–133  
   for COPD, 51  
   edema in, 52, 134  
   in elderly, 196  
   foreign bodies in, 136–137  
   for neonatal conditions, 138–141  
     diaphragmatic hernias, 140  
     PIE, 140  
     RDS, 138, 139  
   pneumonia in, 132  
     focal, 49  
     PCP, 59  
     viral, 132  
   pulmonary contusion in, 60  
   pulmonary embolism in, 375, 378, 379  
 lungs, pediatric abdomen radiography for, 175  
 luxatio erectae, of shoulder, 4, 5  
 LVF. *See* global left ventricular function
- magnetic resonance angiography (MRA), 497  
   for cervicocranial vascular disease, 501  
   extremities angiography v., with CT, 506  
 magnetic resonance imaging (MRI), 517–520. *See also* brain, MRI of; extremities, MRI of  
   of abdomen, 568–570  
     for AAA, 574–575  
     for acute appendicitis, 570  
     for acute cholangitis, 568  
     for acute pancreatitis, 570  
     for aortic dissection, 575  
     for ascites, 581  
     for cholecystitis, 568  
     for choledocholithiasis, 580  
     for cholelithiasis, 579  
     clinical images for, 571–584  
     clinical indications for, 568, 569  
     for cysts, 575, 582, 583  
     diagnostic capabilities of, 568–570  
     for hepatocellular carcinoma, 582  
     for hydronephrosis, 578  
     imaging limitations for, 570  
     for metastatic liver disease, 583  
     for pancreatic cysts, 583  
     for renal artery stenosis, 577  
     for renal cell carcinoma, 576  
     for splenic infarct, 581  
     for splenomegaly, 580  
   with angiography, 497, 506  
   of brain, 521–522  
     clinical images of, 522–536  
     diagnostic capabilities of, 522  
     imaging limitations of, 522  
     indications for, 522  
   cervical spine under, 540  
   cMRI, 560–562, 563–566  
     ACA/AHA guidelines for, 561  
     ACR guidelines for, 560  
     advantages of, 560–561  
     for aortic dissection, 561–562, 564  
     for cardiomyopathy, 566  
     clinical images of, 563–566  
     for coarctation, 565  
     DE-cMRI and, 562  
     diagnostic capabilities of, 561, 562  
     imaging limitations for, 562  
     indications for, 560, 561, 566  
     for myocardial infarction, 565  
     NFD and, 562  
   CT v., for spinal trauma, 404–405  
   of extremities, 586–587  
     clinical images for, 588–599, 607–612, 631  
     diagnostic capabilities of, 587  
     imaging limitations for, 587  
     indications for, 586–587  
   for foreign body wounds, 3  
   image formation in, 518–519  
     characteristics in, 519  
   lumbar spine under, 541  
   NMR and, 521  
   physical principles of, 517–518, 521  
     ADC in, 519  
     angular momentum in, 517  
     electron excitation as, 518  
     free v. bound water and, 519  
     k-space in, 519  
     magnetic field in, 518  
     precession in, 517  
   relaxation times in, 519, 521  
   safety considerations for, 520  
     during pregnancy, 520  
   for soft tissue pathology, 3  
   for spinal trauma, 538–558  
     for bone marrow abnormalities, 539  
     for cervical cord transection, 542  
     diagnostic capabilities of, 539  
     for disc extrusions, 546, 548  
     for disc herniation, 547  
     for ependymomas, 555  
     for epidural abscesses, 549  
     for fractures, 542, 543–546  
     with gadolinium contrast, 540  
     for gastric cancer, 553  
     for hemangiomas, 555  
     imaging limitations of, 539–540  
     incidence rates for, 538  
     indications for, 538–539  
     for infection, 539  
     for laminectomies, 558  
     for leukemia, 555  
     for multiple myelomas, 554  
     for multiple sclerosis, 556  
     for myelitis, 556–557  
     for myelopathies, 539  
     for prostate cancer, 554  
     for spinal dislocation, 541  
     for spondylolisthesis, 547  
     for stenosis, 539  
     for subdural hematomas, 550  
     for subluxation, 543  
     for synovial cyst, 548  
     for syringomyelia, 557  
     for tuberculosis, 539, 551–552  
   main lobar fissure (MLF), 219  
   Mallet finger, 9  
   malrotation, bowel obstruction from, 158–160  
     testing for, 159–160  
   mandible fractures, under CT, 441  
     diagnostic capabilities of, 441  
     imaging limitations of, 441  
     indications for, 441  
   maxilla fractures, under CT, 440–441  
     diagnostic capabilities of, 440–441  
     imaging limitations of, 441  
     indications for, 440  
   Le Fort fractures and, 440–441  
 MDCT. *See* multidetector spiral computed tomography  
 mechanical index (MI), in ultrasound, 211  
 median nerve block, ultrasound of, 216  
 mediastinum  
   chest CT for, 464–467  
     for aortic tear, 465  
     for diaphragmatic ruptures, 467  
     for esophageal ruptures, 466  
     for pericardial effusion, 465  
     pneumomediastinum, 464  
     for pneumomediastinum, 464  
     for tracheobronchial injuries, 466  
   CXR for, 131, 146–150  
     with barium study, 150  
     cardiomediastinum, 46, 57  
     for diGeorge syndrome, 148  
     in infants, 144–149  
     pneumomediastinum, 60, 146–147  
 meningiomas, 535  
 mesenteric injury, 476  
 mesenteric vessels, 489, 494–495  
 metal synovitis, 28  
 metaphyseal fractures, 177  
 metatarsal stress fractures, 39  
 MI. *See* mechanical index, in ultrasound  
 midgut volvulus, 157–160  
   with barium study, 158  
   definition of, 157  
   infants with, 158  
 mirror image artifacts, for ultrasound, 216  
 MLF. *See* main lobar fissure  
 M-mode, in ultrasound, 212  
 molar pregnancy, 324  
 Monteggia fractures, 123  
 Morison's Pouch, 237, 240  
 MRA. *See* magnetic resonance angiography  
 MRI. *See* magnetic resonance imaging  
 multidetector spiral computed tomography (MDCT), 457, 473, 474, 497. *See also* angiography, with CT  
   multiple myelomas, 399–400  
   spinal trauma MRI for, 554  
   multiple sclerosis, 534  
   spinal trauma MRI for, 556

- muscles, ultrasound for, 348
- musculoskeletal system. *See also*
  - elbow/forearm; elbow/forearm, plain radiography for; joints, ultrasound for; knees; ligaments, ultrasound for; tendons, ultrasound for
  - CXR and, 131, 151–152
    - with discitis, 151
    - with osteogenesis imperfecta, 151
  - metastases of, in elderly, 192
  - pediatric abdomen radiography of, for abnormalities, 173–175
    - intussusception and, 174
    - Shenton's arc and, 174–175
  - sonographic anatomy of, 348–349
  - ultrasound for, 347–357
    - for bone, 349
    - for fractures, 350–353
    - imaging limitations of, 357
    - indications for, 350–356
    - for joints, 349
    - for ligaments/nerves, 349
    - for muscle, 348
    - technical considerations for, 347
    - for tendons, 348–356
  - myelitis, spinal trauma MRI for, 556–557
  - myelogram, 419
  - myelopathies, 539
  - myocardial infarction, 376
    - cMRI for, 565
  - nabothian cysts, 320
  - NAC. *See* N-acetylcysteine
  - N-acetylcysteine (NAC), 400
  - neonatal. *See* infants, CXR for
  - neoplasms, in liver, 477
  - nephrogenic fibrotic dermopathy (NFD), 562
  - nephrogenic systemic fibrosis (NSF), 562
  - nerves, ultrasound for, 349
  - neurocysticercosis, 533
  - neurosarcoidosis, 534
  - New England Journal of Medicine*, 290
  - Nexus Low-Risk Criteria (NLC), 92
  - NFD. *See* nephrogenic fibrotic dermopathy
  - NLC. *See* Nexus Low-Risk Criteria
  - NMR. *See* nuclear magnetic resonance
  - NSF. *See* nephrogenic systemic fibrosis
  - nuclear magnetic resonance (NMR), 521
  - occult fractures, 353
  - ocular ultrasound, 325–329
    - applications for, 327–328
      - for retinal detachment, 327
    - diagnostic capabilities of, 325
    - for ICP, 325, 327
    - for lens dislocation, 328
    - for optic neuritis, 328
    - sonographic anatomy of, 325
      - clinical images of, 326
    - sonographic techniques for, 325–326
      - of eye/optic nerve evaluation, 326–327
        - for vitreous hemorrhage, 328
  - odontoid fractures, 98
  - Ogilvie's syndrome, 78
  - optic nerve, 244
  - optic neuritis, 328
  - orbital blow-out fractures, 439–440
    - diagnostic capabilities of, 439
    - imaging limitations of, 439–440
    - indications for, 439
    - theories of, for mechanical mechanism of, 439
  - orchitis, 333
  - Osgood-Schlatter disease, 128
  - osseous tumors, 623–624
  - osteoarthritis, 27, 197–198
  - osteogenesis imperfecta, 151
  - osteomyelitis, 15
    - acute, 29
    - in feet, 42
    - in thoracolumbar spine, 108, 109
    - in toes, 630–631
  - osteosarcomas, 29
    - in knee, 623
  - ovaries, 314, 315
    - under abdomen-pelvis CT, 480
    - cysts in, 322
  - pacemakers
    - cMRI and, 562
    - insertion of, 393
  - Paget disease, 191
  - pain
    - chronic, 3
      - plain radiography for, in shoulder, 3
    - from spinal trauma, 404, 412, 418
  - pancreas
    - under abdomen-pelvis CT, 478–479
    - abdominal ultrasound for, 338
      - clinical images of, 343–344
    - calcification of, 87
    - pseudocysts in, 344, 478
  - pancreatic cancer, 415
    - MRI for, 584
  - pancreatic cysts, 583
  - pancreatitis
    - under abdomen-pelvis CT, 478
    - acute, 338
    - chronic, 343
    - MRI for, 570
    - resuscitation ultrasound for, 391
  - paracentesis, ultrasound for, 301–304
    - anatomic considerations for, 301
    - clinical images for, 302–304
    - indications for, 301
    - pitfalls for, 302
    - procedures for, 301–302
  - patella, plain radiography for, 22–23
  - PCP. *See* pneumocystis carinii pneumonia
  - PDI. *See* Pulse Doppler Imaging
  - PE. *See* pleural effusion, in lungs
  - pediatric abdomen, plain radiography for, 153–175
    - for appendicitis, 160–164
      - appendicoliths and, 160, 163
      - gas distribution and, 164
      - indications for, 160
    - for bony abnormalities, 173–175
      - intussusception and, 174
      - Shenton's arc and, 174–175
    - for bowel obstruction, 153–157
      - barium study for, 158
      - gas distribution and, 155–157
      - ileus v., 153–155
      - in infants, 157, 158
        - by malrotation, 158–160
        - in midgut volvulus, 157, 160
    - diagnostic capabilities of, 153
      - contents and, 153
    - for foreign bodies in, 169–171
      - of ingested materials, 171
      - metallic, 169–171
    - for ileus, 153–157
    - imaging limitations of, 153
    - indications for, 153
    - for intussusception, 164–169
      - bowel obstruction and, 165–166
        - crecent/target signs for, 164–165, 166–167
      - gas distribution and, 166, 169
      - indications for, 164
    - for lungs, 175
    - for pneumatosis intestinalis, 79, 169
      - bowel distention and, 169
      - indications for, 169
      - in infants, 169
    - for urolithiasis, 173
      - development of, 171
      - indications for, 171
      - with renal colic, 171, 173
      - staghorn calculi and, 171–173
  - pediatric cervical spine injuries. *See* cervical spine injuries, pediatric
  - pediatric extremities, plain radiography for, 117–129
    - diagnostic capabilities of, 117
    - for fractures
      - buckle fractures, 120
      - in elbow/forearm, 120, 125
      - epicondylar, 124–125, 126
      - Galeazzi, 124
      - Greenstick, 120
      - hip avulsion, 128
      - humeral/radiocapitellar, 121
      - Monteggia, 123
      - physeal, 117
      - Salter-Harris, 118–119
      - supracondylar, 122–123
      - toddler's, 127
    - imaging limitations of, 117
    - indications for, 117
    - for Osgood-Schlatter disease, 128
    - for radial head subluxation, 126
    - for SCFE, 129
    - for septic arthritis of the hip, 129
  - pediatric infiltrates, 50

- pelvis, plain radiography of, 16, 110–115.  
*See also* abdomen-pelvis, ultrasound  
for  
clinical images for, 111, 115  
of fractures, 111–115  
diagnostic capabilities for, 110  
dislocation of, 113  
in elderly, 181, 191–192  
for bone metastases, 192  
for colon cancer, 192  
for Paget disease, 191  
imaging limitations of, 110–111  
indications for, 110
- perforated viscus, 66
- pericardial effusion, 372–373  
CT for, 465  
with tamponade, 374
- pericardial tamponade, 304, 374  
development of, 305
- pericardiocentesis, ultrasound for, 304–310  
anatomic considerations for, 305  
blind, 304–305  
clinical images for, 306–310  
with parasternal approach, 308  
with subxyphoid approach, 306, 307  
with turbulence, 309  
indications for, 304–305  
for pericardial tamponade, 304, 374  
pitfalls for, 306  
procedures for, 305–306  
views of, 305
- pericholecystic fluid, 226
- peritoneal fluid collections, plain  
radiography for, 67  
causes of, 67
- peritonsillar abscesses, 360–361  
diagnostic capabilities of, 360–361  
imaging for, 361, 362–363, 364–365  
considerations for, 361  
for edema, 362  
limitations of, 361  
indications for, 360
- physeal fractures, 117
- PIE. *See* pulmonary interstitial emphysema
- PIOPED II. *See* Prospective Investigation of  
Pulmonary Embolism Diagnosis II
- plain radiography. *See also* abdomen, plain  
radiography for; cervical spine, plain  
radiography of; chest radiography,  
with plain film; child abuse, plain  
radiography for; elbow/forearm,  
plain radiography for; feet, plain  
radiography of; hand/wrist injuries,  
plain radiography for; lower  
extremities, plain radiography for;  
pediatric abdomen, plain  
radiography for; pelvis, plain  
radiography of; shoulder, plain  
radiography for; upper extremities,  
plain radiography for  
for abdomen, 90  
for abnormal fluid collections, 67  
for appendicitis, 72  
for bladder stones, 86  
for bowel obstructions, 66, 71, 75–76,  
78  
for calcifications, 81, 87, 89  
for cecal volvulus, 73  
for Chilaiditi loops, 79  
diagnostic capabilities of, 65–66  
for feeding tube replacement, 90  
for free air, 69, 80  
for gastrointestinal tract pathology, 67  
for ileus, 66, 70  
imaging limitations for, 67  
indications for, 65  
pediatric, 153–175  
for perforated viscus, 66  
for pneumatosis intestinalis, 79  
for porcelain gallbladder, 88  
for renal stones, 82  
for retroperitoneal  
inflammation/injury, 67  
for sigmoid volvulus, 74  
for solid organs, 66–67  
for staghorn calculi, 83  
for toxic megacolon, 77  
for ureteral stones, 67, 84–85
- of cervical spine, 91–93  
diagnostic applications of,  
demographic data for, 91–92  
for fractures, 98, 99, 101–102  
indications for, 92, 93  
pediatrics and, 93
- for child abuse, 176–179  
diagnostic capabilities for, 176  
fractures from, 177, 178–179  
indications for, 176  
for subdural hematomas, 179
- CXR, 45–62, 152  
of aorta, 131, 143, 144–145, 146  
for bones, 131, 151, 152  
for cardiomegaly, 52  
clinical imaging for, 46, 57, 131–152  
for COPD, 51  
diagnostic capabilities of, 45, 130  
for focal pneumonia, 49  
for fractures, 61  
for free air, 59  
for heart, 131, 141–142, 143  
imaging limitations of, 45, 130  
indications for, 45, 130  
for infants, 48, 135, 138, 139, 140, 141,  
142, 144–149  
intubation and, 57  
for lungs, 46, 52, 60, 62, 63, 131–134,  
136–137  
for masses/nodules, 58  
for mediastinum, 131, 144–147, 148,  
149, 150  
normal views of, 47, 48  
for PCP, 59  
for pediatric infiltrates, 50  
for pleural effusion/hemothorax,  
55–56  
of pneumothorax, 53  
for subcutaneous emphysema, 60  
for tuberculosis, 54
- in elderly, 200  
for abdominal imaging, 181, 193  
CXR, 181, 194, 195, 196, 231  
diagnostic capabilities for, 180  
for extremity imaging, 181, 197–198,  
199, 200  
imaging limitations for, 181  
indications for, 180  
for pelvic imaging, 181, 191, 192  
for rheumatologic conditions, 181,  
197–200  
for spine imaging, 180–181, 182, 183,  
184, 185, 186, 187, 188, 189, 190,  
191
- for heart, 141  
for aorta, 143–146  
for cardiomegaly, 141
- for lower extremities, 15  
of ankles, 31, 32, 33, 35  
of bone cell tumors, 22  
diagnostic capabilities of, 15  
of feet, 16  
of fibia, 30  
of fractures, 17, 18, 20–21, 25, 26, 30,  
31, 32, 33, 34  
imaging limitations of, 15  
indications for, 15  
of knees, 24, 26, 27, 28  
of osteomyelitis, 29  
of osteosarcomas, 29  
of patella, 22–23  
of pelvis, 16, 17, 21  
in toddlers, 30
- for pediatric abdomen, 153–175  
for appendicitis, 160, 163, 164  
for bony abnormalities, 173–175  
for bowel obstruction, 153–157,  
158–160  
diagnostic capabilities of, 153  
for foreign bodies in, 169–171  
for ileus, 153–157  
imaging limitations of, 153  
indications for, 153  
for intussusception, 164–167, 169  
for lungs, 175  
for pneumatosis intestinalis, 79, 169  
for urolithiasis, 171–173
- for pediatric extremities, 117–129  
diagnostic capabilities of, 117  
fractures in, 117, 118–119, 120, 121,  
122–123, 124–125, 126, 127, 128  
imaging limitations of, 117  
indications for, 117  
for Osgood-Schlatter disease, 128  
for radial head subluxation, 126  
for SCFE, 129  
for septic arthritis of the hip,  
129
- of thoracolumbar spine, 106–115  
clinical images for, 107–110  
diagnostic capabilities for, 106  
imaging limitations for, 106  
indications for, 106  
for pelvic region, 16, 110–115



- for upper extremities, 3–9
  - for acute trauma, 3
  - elbow/forearm, 6–8
  - for foreign body wounds, 3
  - hand/wrist, 9
  - imaging limitations of, 4
  - shoulder, 3–6
- pleura, 243
- pleural effusion (PE), in lungs, 55–56, 62, 63, 135, 375
  - with pneumothorax, 386
  - thoracentesis for, 297
- pneumatoxis intestinalis, 79, 169
  - bowel distention and, 169
  - indications for, 169
  - in infants, 169
- pneumocystis carinii pneumonia (PCP), 59
- pneumomediastinum, 60, 146–147
  - CT for, 464
- pneumonia
  - CT for, 461
  - focal, 49
  - PCP, 59
  - resuscitation ultrasound for, 377, 392
  - viral, 132
- pneumothorax, 53
  - with angiography, with CT, 485
  - CT for, 461, 462
  - PE with, 386
  - resuscitation ultrasound for, 383–387
  - tension, 143
  - thoracentesis and, 297
  - ultrasound for, 243
- popliteal vein (PV), 247, 250, 251
- porcelain gallbladder, 88, 230
- posterior fat pads, in elbow/forearm, 7
- postreduction radiographs, 3–4
- Pott's disease. *See* spinal tuberculosis
- PowerFlow Doppler, 205, 211–212
- pregnancy
  - angiography and, with CT, 490
  - cMRI during, 560
  - CT during, 402
    - fetal radiation exposure, 402
  - MRI during, 520
  - RCIN and, as risk factor of, 399
- pregnancy, ultrasound of, 215
  - ectopic, 382
  - EUG, 317–320
  - incarcerated uterus during, 324
  - IUP, 316
    - abnormal, 317
    - molar, 324
- prereduction radiographs, 3–4
- prevertebral soft tissue, 97
- Prospective Investigation of Pulmonary Embolism Diagnosis II (PIOPED II), 562
- prostate cancer, spinal trauma MRI for, 554
- prostate, hypertrophy of, 269, 278
- pseudocysts, 344, 478
- pulmonary embolism, 375, 378, 379
  - in angiography, with CT, 482, 485
  - cardiac ultrasound for, 254
  - cMRI for, 560, 566
  - PIOPED II and, 562
- pulmonary interstitial emphysema (PIE), 140
- Pulse Doppler Imaging (PDI), with testicular ultrasound, 332
- Pulsed Wave Doppler, 205
- Purcell, Edward, 518
- PV. *See* popliteal vein
- pyloric stenosis, 337
  - clinical images of, 340
  - of hypertrophic, 340
- radial head fractures, 7
- radiation, in CT scanning, 402
  - with abdomen-pelvis angiography, 490
  - dosing levels in, 402
- radiographic contrast induced nephropathy (RCIN), 399–402
  - allergic/anaphylactoid reactions as part of, 400–402
  - contrast osmolality and, 400
  - creatinine clearance measurements in, 399
  - pre-treatment guidelines for, 401
  - prevention of, 400–402
    - guidelines for, 401
    - with hydration therapy, 400
    - with NAC, 400
  - risk factors for, 399, 400
    - contrast dye as, 400
    - diabetes mellitus as, 400
    - multiple myeloma as, 399–400
    - pregnancy as, 399
- radiography. *See* computed tomography; magnetic resonance imaging; plain radiography; ultrasound
- radiology. *See* magnetic resonance imaging
- RCIN. *See* radiographic contrast induced nephropathy
- RDS. *See* respiratory distress syndrome, in infants
- refraction, 214
- renal artery stenosis, 577
- renal cell carcinoma, 576
- renal colic, 171, 173
- renal cysts/masses, 269, 275
  - under MRI, 575
- renal stones, 82, 274
- renal ultrasound, emergency, 268–279
  - for acute trauma, 272
  - diagnostic capabilities of, 268–269
    - for bladder, 269, 277
    - for carcinomas, 269, 276
    - for cysts/masses, 269, 275
    - for hydronephrosis, 269, 272–273
    - for prostatic hypertrophy, 269, 278
  - for horseshoe kidney, 279
  - imaging limitations of, 269–270
    - false negatives and, 269–270
  - indications for, 268
  - for normal kidney, 270
  - for renal disease, 275
  - for renal stones, 274
- respiratory distress syndrome (RDS), in infants, 138, 139
- resuscitation, ultrasound in, 367–369
  - for AAA, 389–390
  - for acute cholecystitis, 391–392
  - for appendicitis, 391
  - for bowel obstruction, 391
  - cardiothoracic disease etiologies for, 368–369
    - for abdominal diseases, 368
    - for cardiogenic hypotension, 367–368
    - for cardiomyopathy, 374–375, 376, 381
    - for dyspnea, 369
    - for myocardial infarction, 376
    - for PE, 375
    - for pericardial effusion, 372–373, 374
  - diagnostic capabilities of, 367–368
  - ectopic pregnancy, 382
  - for fluid status, evaluation of, 379–382
    - in abdomen, 382
  - for gallbladder, 391–392
  - for hydronephrosis, 392
  - for hypervolemia, 379, 380
  - imaging limitations for, 369, 388–390
  - indications for, 367
  - for pacemaker insertion, 393
  - for pancreatitis, 391
  - for pneumonia, 377, 392
  - for pneumothorax, 383–387
    - PE with, 386
  - for pulmonary embolism, 375, 378, 379
  - thoracic disease etiologies for, 368
  - TTE v. TEE approach for, 369, 388
  - for vascular access, 392–393
- reverberation, 215–216
  - comet-tail, 215–216
  - ring-down, 215, 216
- rheumatoid arthritis, 15
  - in feet, 43
  - MRI for, 605
- rib/sternum, fractures of, 61, 352
  - clinical images of, 352, 353, 354, 469
- saccular aneurysm, of aorta, 284
- SAH. *See* subarachnoid hemorrhage
- Salter-Harris fractures, 118–119
  - type 1, 118
  - type 2, 118
  - type 3, 118
  - type 4, 119
  - type 5, 119
- scaphoid fractures, 9, 11
  - ultrasound for, 355
- scapular fractures, 61, 469
- scatter, 215
  - ultrasound of, 215
- SCFE. *See* slipped capital femoral epiphysis
- Schmorl's nodule, 190
- SCIWORA. *See* Spinal Cord Injury without Radiographic Abnormality
- SDI. *See* Spectral Doppler Imaging
- septic arthritis of the hip, 129, 198
- SFV. *See* superficial femoral vein
- Shenton's arc, 174–175

- shoulder  
 MRI for, 588–593  
 of dislocations, 590, 591  
 of fractures, 593  
 of tears, 590, 591–592  
 plain radiography for, 3–6  
 AC separation in, 4  
 for acute trauma, 3  
 AC view of, 4  
 anterior dislocations of, 4, 5  
 apical oblique view of, 4  
 AP view of, 4  
 axillary view of, 4  
 Bankart fractures in, 4, 6  
 for chronic pain, 3  
 clavicle fractures in, 4  
 diagnostic capabilities for, 4  
 Hill-Sachs deformity in, 4, 6  
 humeral head fractures of, 4, 6  
 indications for, 3–4  
 lateral view of, 4  
 limitations of, 4  
 luxatio erectae of, 4, 5  
 posterior dislocations of, 4, 5  
 postreduction, 3–4  
 prereduction, 3–4
- sigmoid volvulus, 74
- skeletal system. *See* musculoskeletal system
- skull fractures, 178–179. *See also* head, CT  
 for  
 complex, 179  
 CT for, 420  
 linear, 178
- slipped capital femoral epiphysis (SCFE), 129
- SMA. *See* superior mesenteric artery
- Smith's fractures  
 AP, 9, 10  
 lateral, 9, 10
- soft tissue pathologies, radiology  
 applications for, 3
- soft tissues, ultrasound for, 358–361. *See also* peritonsillar abscesses  
 diagnostic capabilities of, 358–359  
 for foreign bodies in, 359–360  
 diagnostic capabilities of, 359–360  
 imaging for, 360, 363–364  
 indications for, 359
- imaging for, 359  
 limitations in, 359  
 principles for, 359
- infection indications for, 358  
 for CA-MRSA, 358  
 for peritonsillar abscesses, 360–361  
 diagnostic capabilities of, 360–361  
 imaging for, 361, 362–363, 364–365  
 indications for, 360
- Spectral Doppler Imaging (SDI), 212  
 for DVT, 250–251  
 for testicular ultrasound, 330  
 in Triplex ultrasound, 330
- spigelian hernias, 338
- Spinal Cord Injury without Radiographic Abnormality (SCIWORA), 93  
 CT for, disadvantages of, 406
- spinal films, plain. *See also* cervical spine,  
 plain radiography of  
 for elderly, 180–181, 182–191  
 for annular calcification, 190  
 for cervical hyperostosis, 183  
 for cervical vertebral body destruction,  
 183  
 for Dens fracture, 184  
 for DISH, 181, 185  
 for DJD, 181, 187, 189  
 for fractures, 180–181, 182  
 for lumbar region, 187–189  
 for Schmorl's nodule, 190  
 for spondylolisthesis, 188  
 for tumors, 181
- spinal stenosis, 539
- spinal trauma, CT for, 404–406. *See also*  
 cervical spine injuries  
 clinical images of, 406–419  
 Clay Shoveler's fracture, 408  
 for dens fracture, 408  
 for dextro-scoliosis, 417  
 for enostosis, 419  
 for Hangman's fracture, 408  
 for Jefferson's fracture, 409  
 with kyphosis, 416  
 of myelogram, 419  
 with pancreatic cancer, 415  
 with uterine cancer, 416  
 diagnostic capabilities of, 405  
 disadvantages of, 405–406  
 in pediatric evaluations, 405–406  
 in SCIWORA, 406  
 indications for, 404–405  
 MRI v., 404–405  
 pain as symptom of, 404, 412, 418  
 plain radiography v., 404
- spinal trauma, MRI for, 538–558  
 for bone marrow abnormalities, 539  
 for cervical cord transection, 542  
 diagnostic capabilities of, 539  
 for disc extrusions, 546, 548  
 for disc herniation, 547  
 for ependymomas, 555  
 for epidural abscesses, 549  
 for fractures, 542, 543–546  
 with gadolinium contrast, 540  
 for gastric cancer, 553  
 for hemangiomas, 555  
 imaging limitations of, 539–540  
 scanner immobility and, 540  
 incidence rates for, 538  
 indications for, 538–539  
 for infection, 539  
 for laminectomies, 558  
 for leukemia, 555  
 for multiple myelomas, 554  
 for multiple sclerosis, 556  
 for myelitis, 556–557  
 for myelopathies, 539  
 for prostate cancer, 554  
 for spinal dislocation, 541  
 for spondylolisthesis, 547  
 for stenosis, 539
- for subdural hematomas, 550  
 for subluxation, 543  
 for synovial cyst, 548  
 for syringomyelia, 557  
 for tuberculosis, 551–552  
 spinal, 539
- spinal tuberculosis, 539
- spleen, 242  
 under abdomen-pelvis CT, 478  
 abdominal ultrasound for, 338  
 clinical images of, 345  
 under angiography, with CT, 493–494,  
 495–496  
 hemangioma in, 345  
 infarct in, MRI for, 581
- splenic arteries, 493–494, 495–496
- splenomegaly, 345  
 MRI for, 580
- spondylolisthesis, 188  
 spinal trauma MRI for, 547
- sprains, to wrist, 603
- staghorn calculi, 83
- uroolithiasis and, 171–173
- stenosis. *See also* hypertrophic pyloric  
 stenosis  
 renal artery, 577  
 spinal trauma MRI for, 539
- sternal fractures, 470
- strokes. *See also* hemorrhagic stroke;  
 ischemic stroke  
 under head and neck angiography, with  
 CT, 500  
 for detection of, 502  
 for perioperative management of,  
 500  
 under MRI, 528
- subarachnoid hemorrhage (SAH), 499  
 under MRI, 529
- subcutaneous emphysema. *See* emphysema,  
 subcutaneous
- subdural hematomas, 179, 429  
 under MRI, 530  
 spinal trauma MRI for, 550
- superficial femoral vein (SFV), 247
- superior mesenteric artery (SMA), 494–495
- supracondylar fractures, 122–123
- Swimmer's view, of cervical spine, 97
- synovial cysts, 548
- syringomyelia, 557
- TEE. *See* transesophageal echocardiography
- tendons, ultrasound for, 348  
 anisotropy in, 348  
 clinical images in, 356  
 for injuries to, 355–356
- “tennis elbow,” 6
- tenosynovitis, 627
- testicular ultrasound, 330–335  
 clinical images of, 331–335  
 of benign masses, 334  
 of calcifications, 335  
 of epididymitis, 333  
 of extratesticular fluid, 332  
 of malignant masses, 335

- of normal testicle, 331
  - of orchitis, 333
  - patient draping, 331
  - of testicular torsion, 333
- diagnostic capabilities of, 330
- imaging limitations of, 330–331
- indications for, 330
  - with CDI, 330, 332
  - with grayscale ultrasound, 330
  - with PDI, 332
  - with SDI, 330
- Tetralogy of Fallot, 142
- TGC. *See* time gain compensation
- thermal index (TI), in ultrasound, 211
- thoracentesis, ultrasound for, 297–299
  - anatomic considerations for, 297
  - clinical images for, 297–299
  - indications for, 297
    - for PE, 297
    - for pneumothorax, 297
  - pitfalls of, 297
  - procedures for, 297
- thoracic disease, 368
- thoracolumbar spine, plain radiography of, 106–115. *See also* pelvis, plain radiography of
  - clinical images for, 107–110
    - for aortic aneurysm, 110
    - for compression fracture, 108, 110
    - for endplate fracture, 108, 109
    - for lumbar spine, 107
    - of osteomyelitis, 108, 109
    - for retropulsion fracture, 109
    - for thoracic spine, 107
  - diagnostic capabilities for, 106
  - imaging limitations for, 106
  - indications for, 106
  - for pelvic region, 16, 110–115
    - clinical images for, 111, 115
    - diagnostic capabilities for, 110
    - hip dislocation in, 113
    - imaging limitations of, 110–111
    - indications for, 110
- thrombolytic therapy, 503
- TI. *See* thermal index, in ultrasound
- tibia
  - fractures of, 25, 30, 34
  - spinal avulsion of, 26
- time gain compensation (TGC), 209–210
- toddler fractures, 30, 127
  - from child abuse, 179
- toes, MRI for, 630–631
  - osteomyelitis in, 630–631
- Torus fracture. *See* buckle fractures
- toxic megacolon, 77
- transesophageal echocardiography (TEE), 255
  - resuscitation ultrasound in, TTE v., 369, 388
- transthoracic echocardiography (TTE), 255. *See also* cardiac ultrasound, emergency
  - in resuscitation ultrasound, TEE v., 369, 388
- trauma, acute
  - head and neck angiography for, with CT, 499, 500
  - imaging limitations of, 500
  - to kidneys, 272
  - to spine, 538
  - ultrasound for, 237
    - diagnostic capabilities of, 236–237
    - to distal radius, 244
    - FAST and, 236, 237, 238, 239
    - to hemoperitoneum, 240–241
    - imaging limitations of, 237
    - indications for, 236
    - to Morison's Pouch, 237, 240
    - to optic nerve, 244
    - to pleura, 243
    - to pneumothorax, 243
    - to spleen, 242
  - in upper extremities, 3
    - to hand/wrist, 9
    - in shoulder, 3
- Triplex ultrasound, 330
- trochanter fractures, 20
  - horizontal/pathologic, 20–21
- TTE. *See* transthoracic echocardiography
- tuberculosis, 54
  - in infants, 135
  - spinal, 539, 551–552
- Tuft fracture, 9, 13
- tumors. *See* bone cell tumors; carcinomas, ultrasound for; osseous tumors
- ulcers, in ankle, 629
- ultrasound. *See also* abdomen-pelvis, ultrasound for; bedside ultrasound; biliary ultrasound; cardiac ultrasound, emergency; central venous catheters, in ultrasound; deep venous thrombosis, ultrasound for; foreign bodies, ultrasound for; kidneys, emergency ultrasound for; lumbar puncture, ultrasound for; ocular ultrasound; paracentesis, ultrasound for; pericardiocentesis, ultrasound for; renal ultrasound, emergency; resuscitation, ultrasound in; soft tissues, ultrasound for; thoracentesis, ultrasound for; urinary bladder, ultrasound for; urinary tract, ultrasound for
  - for abdomen, 337–345
    - for acute appendicitis, 337, 338–339
    - diagnostic capabilities of, 337–338
    - for hernias, 338, 342
    - imaging limitations for, 338–345
    - indications for, 337
    - for intussusception, 337–338, 341
    - for pancreas, 338, 343–344
    - for pyloric stenosis, 337, 340
    - for small bowel obstruction, 342
    - for spleen, 338, 345
  - for abdominal aorta, 280
    - for AAA, 280, 281, 284, 285
    - diagnostic capabilities of, 280
  - dissection of, 285
    - of enlarged iliac arteries, 281
    - imaging limitations of, 280
    - indications for, 280
    - normal view of, 280–281
    - for saccular aneurysm, 284
    - for thrombus, in inferior vena cava, 285
  - for abdominal-pelvis, 313–324
    - for cysts n, 320, 322
    - diagnostic capabilities for, 313
    - of EMS, 314
    - of EUG, 317–319, 320
    - of FF, 323
    - for fibroids, 321
    - imaging limitations for, 313
    - indications for, 313
    - of IUP, 316, 317
    - of molar pregnancy, 324
    - of ovaries, 314, 315, 322
    - of uterus, 314–315, 324
    - of vaginal stripe, 314
  - for acute trauma, 237
    - diagnostic capabilities of, 236–237
    - to distal radius, 244
    - FAST and, 236, 237, 238, 239
    - to hemoperitoneum, 240–241
    - imaging limitations of, 237
    - indications for, 236
    - to Morison's Pouch, 237, 240
    - to optic nerve, 244
    - to pleura, 243
    - to pneumothorax, 243
    - to spleen, 242
  - beam width in, 210–211
  - bedside, 207
    - applications of, 203
    - archiving for, 205, 206
    - billing for, 205–206, 207
    - equipment care for, 206
    - machines for, 203–205
    - policy of use for, 205
    - privileging for, 205, 206
    - quality improvement for, 206
    - result reporting for, 205
    - technicians for, 204
    - training guidelines for, 205, 206–207
    - troubleshooting for difficulties with, 207
    - use demographics for, 203
  - biliary, 218–235
    - for abscesses, 218
    - of bile ducts, 231–235
    - biologic effects of, 217
    - of cholecystitis, 214, 216
    - cholescintigraphy and, 218
    - data analysis for, 211
    - diagnostic capabilities of, 218
    - Doppler applications in, 205, 211–212
    - FAST with, 217
    - for foreign body wounds, 3
    - frequency in, 210

- ultrasound. (*Continued*)
    - of gallbladder, 214, 215, 216, 219–227, 228, 230, 231
    - gallstones under, 221–222
    - image artifacts for, 213–214, 215, 216–217
    - imaging limitations of, 218–219
    - indications for, 218
    - of intrauterine pregnancy, 215
    - of median nerve block, 216
    - MI in, 211
    - M-mode, 212
    - physics of, 217
      - principles of, 209
    - for soft tissue pathology, 3
    - system controls for, 209–212
    - TI in, 211
    - transducer selection in, 212–213, 216
    - of urinary bladder, 215, 217
  - for DVT, 247
    - abscesses and, 253
    - Baker’s Cyst and, 252
    - cellulitis and, 252
    - diagnostic capabilities of, 246–247
    - femoral vessels under, 247, 249, 252
    - imaging limitations with, 247
    - indications for, 246
    - probe placement for, 248
    - proximal, 251
    - PV and, 247, 250, 251
    - SDI in, 250–251
    - techniques for, 247
  - emergency cardiac, 254–256
    - apical views in, 258, 260, 261, 263
    - CDI in, 262, 265
    - consultant v. physician performed, 254–255
    - diagnostic capabilities of, 254–255
    - echo in, 254
    - effusion in, 255
    - experience recommendations for use of, 255
    - global LVF in, 255
    - imaging modalities for, 255–256, 257–258, 262
    - indications for, 254
    - parasternal axis views in, 257–258, 259, 260, 261, 262–265
    - for PE, 254
    - right ventricular strain in, 255
    - subxiphoid view in, 259, 260, 261, 262
    - TTE v. TEE, 255
  - emergency renal, 268–279
    - for acute trauma, 272
    - diagnostic capabilities of, 268–269, 272–273, 275, 276, 277, 278
    - for horseshoe kidney, 279
    - imaging limitations of, 269–270
    - indications for, 268
    - for normal kidney, 270
    - for renal disease, 275
    - for renal stones, 274
  - grayscale, 330
  - guided procedures for, 287–310
    - of CVC, 290–293
    - for foreign body detection, 294–295
    - for LP, 299–300
    - for paracentesis, 301–304
    - for pericardiocentesis, 304–310
    - for thoracentesis, 297–299
    - of urinary bladder, 287–289
      - biliary, 217, 269
      - emergency renal, 277
    - for musculoskeletal system, 347–357
      - for bone, 349
      - for fractures, 350–353
      - imaging limitations of, 357
      - indications for, 350–356
      - for joints, 349
      - for ligaments/nerves, 349
      - for muscle, 348
    - sonographic anatomy of, 348–349
    - technical considerations for, 347
    - for tendons, 348–356
  - ocular, 325–329
    - applications for, 327–328
    - diagnostic capabilities of, 325
    - for ICP, 325, 327
    - for lens dislocation, 328
    - for optic neuritis, 328
    - sonographic anatomy of, 325, 326
    - sonographic techniques for, 325–327
    - for vitreous hemorrhage, 328
  - in resuscitation, 367–369
    - for AAA, 389–390
    - for acute cholecystitis, 391–392
    - for appendicitis, 391
    - for bowel obstruction, 391
  - cardiothoracic disease etiologies for, 368–369
  - diagnostic capabilities of, 367–368
  - ectopic pregnancy, 382
  - for fluid status, evaluation of, 379–382
    - for gallbladder, 391–392
    - for hydronephrosis, 392
    - for hypervolemia, 379, 380
  - imaging limitations for, 369, 388–390
  - indications for, 367
    - for pacemaker insertion, 393
    - for pancreatitis, 391
    - for pneumonia, 377, 392
    - for pneumothorax, 383–387
    - for pulmonary embolism, 375, 378, 379
  - thoracic disease etiologies for, 368
  - TTE v. TEE approach for, 369, 388
  - for vascular access, 392–393
- for soft tissues, 358–361
  - diagnostic capabilities of, 358–359
  - for foreign bodies in, 359–360
  - imaging for, 359
  - infection indications for, 358
  - for peritonsillar abscesses, 360–361
- testicular, 330–335
  - clinical images of, 331, 332, 333, 334, 335
  - diagnostic capabilities of, 330
  - imaging limitations of, 330–331
  - indications for, 330, 332
- Triplex, 330
- upper extremities, plain radiography for, 3–9
  - acute trauma in, 3
  - in elbow/forearm, 6–8
    - AP view of, 7
    - diagnostic capabilities of, 7
    - dislocations in, 7, 8
    - Galeazzi fractures, 7, 8
    - Galeazzi fractures in, 7, 8
    - for “golfer’s elbow,” 6
    - imaging limitations for, 7
    - indications for, 6
    - lateral view of, 7
    - posterior fat pad in, 7
    - radial head fractures in, 7
    - supplementary views of, 7
    - for “tennis elbow,” 6
  - for elderly, 181, 197–200
    - for chondrocalcinosis of the knee, 199
    - for DJD, 200
    - for fractures, 197
    - for osteoarthritis, 197–198
  - foreign body wounds in, 3
  - in hand/wrist injuries, 9
    - for acute trauma, 9
    - Boxer’s fracture, 9, 13
    - carpal tunnel disease and, 9
    - Colles fractures, 9, 10
    - diagnostic capabilities of, 9
    - dislocations, 9, 11–12
    - FOOSH, 9
    - imaging limitations for, 9
    - indications for, 9
    - interphalangeal dislocation, 3
    - Mallet finger, 9
    - scaphoid fractures, 9, 11
    - scapho-lunate disassociation, 9, 11
    - Smith’s fracture, 9, 10
    - Tuft fracture, 9, 13
  - in shoulder, 3–6
    - AC separation in, 4
    - for acute trauma, 3
    - AC view of, 4
    - anterior dislocations of, 4, 5
    - apical oblique view of, 4
    - AP view of, 4
    - axillary view of, 4
    - Bankart fractures in, 4, 6
    - for chronic pain, 3
    - clavicle fractures, 4
    - diagnostic capabilities for, 4
    - Hill-Sachs deformity in, 4, 6
    - humeral head fractures of, 4, 6
    - indications for, 3–4
    - lateral view of, 4
    - limitations of, 4
    - luxatio erectae of, 4, 5
    - posterior dislocations of, 4, 5
    - postreduction radiography for, 3–4
    - prereduction radiography for, 3–4
  - ureteral stones, 67, 84–85



ureterolithiasis, 479	uterine cancer, 416	in feet, 41–42
urinary bladder, ultrasound for	uterus, 314–315	by gunshot, 103
biliary, 215, 217, 269	FF in, 323	MRI for, 3
for tumors, 277	in pouch of Douglas, 323	plain radiography for, 3
bladder stones and, 86	in uterovesicular pouch, 323	ultrasound for, 3
carcinomas in, 277	fibroid calcifications in, 81	wrist. <i>See also</i> hand/wrist injuries, plain
emergency renal, 269, 277	incarcerated, during pregnancy, 324	radiography for
guided procedures for, with		MRI for, 600–606
catheterization, 287–289	vaginal stripe, 314	for bony injuries, 601
anatomic considerations for, 287	vascular system, calcification in, 89	for edema, 601–602
disadvantages of, 288	venous thromboembolism, 489	for Gamekeeper’s thumb, 604
images of, 288–289	ventral wall hernias, 338	for rheumatoid arthritis, 605
indications for, 287	vertebral fractures, 470	for sprains, 603
success rates for, 287	vitreous hemorrhage, 328	for tears, 604
urinary tract, ultrasound for	volvulus	
bladder for, 215, 217, 269	cecal, 73	x-rays. <i>See</i> chest radiography, with plain film
for tumors, 277	midgut, 157–160	
emergency, 268–279	definition of, 157	ZMC. <i>See</i> zygomaticomaxillary complex
urolithiasis, 173	sigmoid, 74	zygoma fractures, under CT, 440
development of, 171	wounds, by foreign bodies	indications for, 440
indications for, 171	in brain, 536	ZMC and, 440
with renal colic, 171, 173	CT for, 3	zygomaticomaxillary complex (ZMC),
staghorn calculus and, 171–173		440