# LaFleur Brooks' Health Unit Coordinating

7th edition

Chapter 15

Diagnostic Imaging Orders

# Lesson 15.1

## The Diagnostic Imaging Department, Patient Positioning, and Radiographic Procedures

1. Define the terms in the vocabulary list.
2. Write the meaning of the abbreviations in the abbreviations list.
3. Explain how the health unit coordinator's responsibilities regarding diagnostic imaging orders differ with the implementation of the electronic medical record and computer physician order entry versus use of the paper chart.

# Lesson 15.1

## The Diagnostic Imaging Department, Patient Positioning, and Radiographic Procedures (cont'd)

4. List the information regarding the patient that the health unit coordinator must include when ordering procedures to be performed by the diagnostic imaging department.
5. Explain the respective roles of a radiographer and a radiologist.
6. Explain the benefits of picture archiving and communication systems for the patient and the doctor.

# Lesson 15.1

## The Diagnostic Imaging Department, Patient Positioning, and Radiographic Procedures (cont'd)

7. Name five patient positions that may be included in a diagnostic imaging order.
8. Identify diagnostic imaging orders that do not require routine preparation.
9. Explain when a patient would be required to sign an informed consent before a diagnostic imaging procedure.

# Lesson 15.1

## The Diagnostic Imaging Department, Patient Positioning, and Radiographic Procedures (cont'd)

10. Explain why contrast media are used and list types commonly used.
11. Discuss sequencing or scheduling of multiple diagnostic imaging procedures ordered for the same patient.
12. Identify four diagnostic imaging procedures that would require routine preparation and explain the importance of preparing the patient before these procedures.

# Diagnostic Imaging

- May also be called *medical imaging*
- Modalities include:
  - Radiography
  - Nuclear medicine
  - Ultrasonography
  - Computed tomography (CT)
  - Magnetic resonance imaging (MRI)
  - Special and Interventional Procedures

# HUC Responsibilities with Diagnostic Imaging Orders: EMR

- Orders are entered directly into the patient's EMR and are automatically sent to the diagnostic imaging department.
- The HUC may have tasks to perform, such as coordinating scheduling, ordering special diets, etc.
- An icon may appear, indicating a HUC task, or it may signify a nurse request.

# HUC Responsibilities with Diagnostic Imaging Orders: EMR, cont'd

- The HUC will have to communicate with the nutritional care department (by e-mail or telephone) when ordering a diet for a patient who has completed a diagnostic procedure that required NPO status.

# HUC Responsibilities with Diagnostic Imaging Orders: Paper Chart

- Orders are communicated by the ordering step of transcription via computer or by completion of a downtime requisition form.
- The patient may be transported by the diagnostic imaging department staff, transport service, or nursing department staff.

# Portable X-rays

- These are an exception to the standard transportation procedure.
- Requires the radiographer to take the portable equipment to the patient's room
- Ordered when movement might be detrimental to the patient's condition
- Written order by the patient's physician is required.

# Information to Include When Placing a Diagnostic Imaging Order

- Reason for procedure (clinical indication)
- Transportation required
- Whether patient is receiving intravenous fluids
- Whether patient is receiving oxygen
- Whether patient needs isolation precautions
- Whether patient has a seizure disorder
- If patient does not speak English

# Information to Include When Placing a Diagnostic Imaging Order, cont'd

- Whether patient is diabetic
- Whether patient is sight or hearing impaired
- Whether patient is pregnant or pregnancy test results are pending
  - This information will assist personnel in the diagnostic imaging department to provide better care for the patient.

# Roles of the Radiologist and the Radiographer

- Radiographer: a person with special education in the area of radiography
  - Carries out x-ray studies in the radiology area of the diagnostic imaging department
- Radiologist: a doctor who is a specialist in radiology
  - Interprets developed x-ray images

# Picture Archiving and Communication Systems (PACS)

- Computers or networks dedicated to the storage, retrieval, distribution, and presentation of images
- Full PACS manage images from various modalities.
- PACS replace hard copy-based means of managing medical images, such as film archives.
- PACS provide off-site viewing and reporting (distance education, telediagnosis).

# Picture Archiving and Communication Systems (PACS), cont'd

- When a study has been reported by the radiologist, the PACS can mark it as read; this avoids needless double reading.
- Dictation of reports also can be integrated into a single system and automatically sent to a transcriptionist workstation for typing.
- It also can be made available for access by physicians, avoiding typing delays for urgent results, or retained in cases of typing error.
- The report can be attached to the images and be viewable to the physician.

# Picture Archiving and Communication Systems (PACS), cont'd

- Physicians at various physical locations may access the same information simultaneously.
- Global PACS and other networks enable images to be sent throughout the world.
- PACS should interface with the existing hospital information systems (HIS), the IT department, and radiology information system (RIS).
- An icon indicating a diagnostic medical image in a patient's medical record would allow the physician to view the image and the report.

# Patient Positioning

- Positions used most frequently when writing x-ray orders:
  - AP position: This view may be taken while the patient is standing or lying on the back (supine); the machine is placed in front of the patient.
  - PA position: This view may be taken while the patient is standing or lying on the stomach (prone) with the x-ray machine aimed at the patient's back.
  - Lateral position: This view is taken with the patient standing or lying on the side.

# Patient Positioning, cont'd

- Most frequent positions, cont'd:
  - Oblique position: This picture is taken with the patient standing or lying halfway on the side in the AP or the PA position.
  - Decubitus position: In this view, the patient is lying on the side with the x-ray beam positioned horizontally.

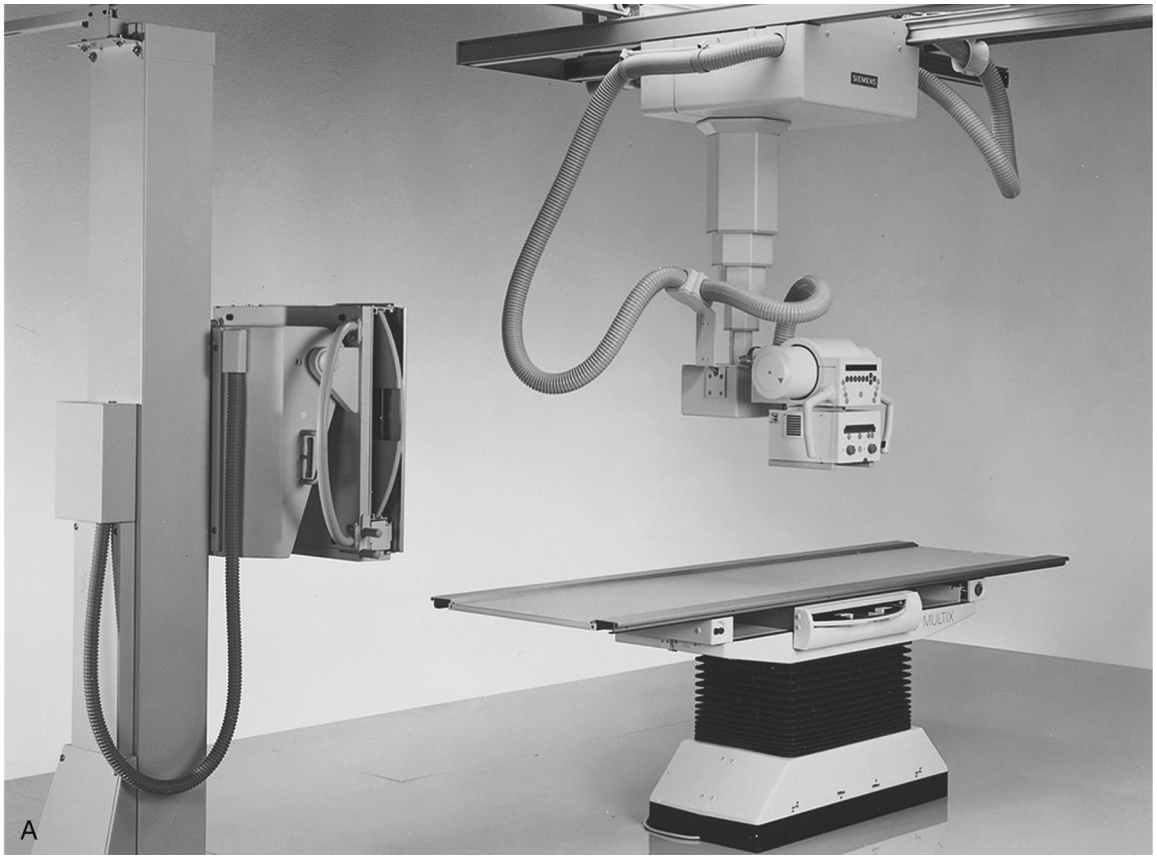
# X-Rays that Do Not Require Preparation

- X-rays can penetrate solid material, such as bone.
  - This produces a shadow that is recorded on film.
- Procedures that require the filming of bone structures or that are ordered to determine the position of other organs in relation to these structures can be performed without the need for preparation for the procedure.

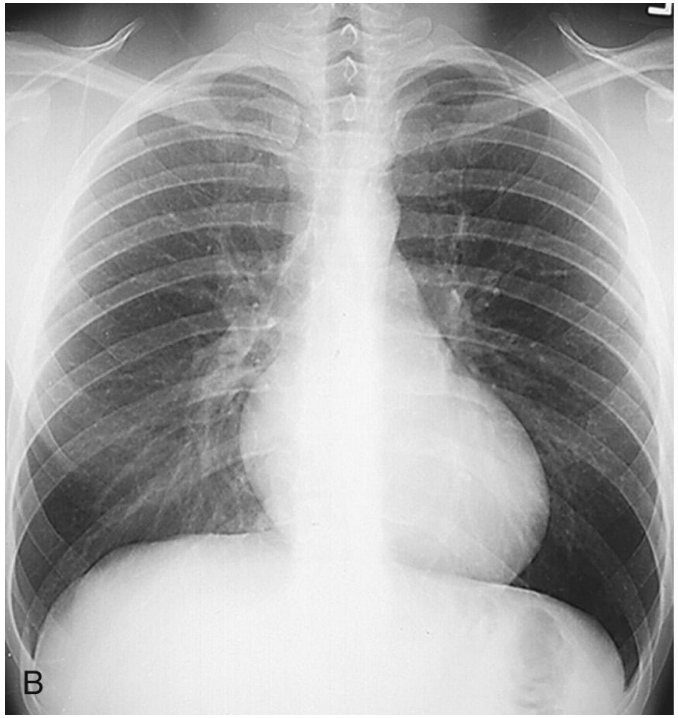
# Doctors' Orders for X-rays that Do Not Require Preparation

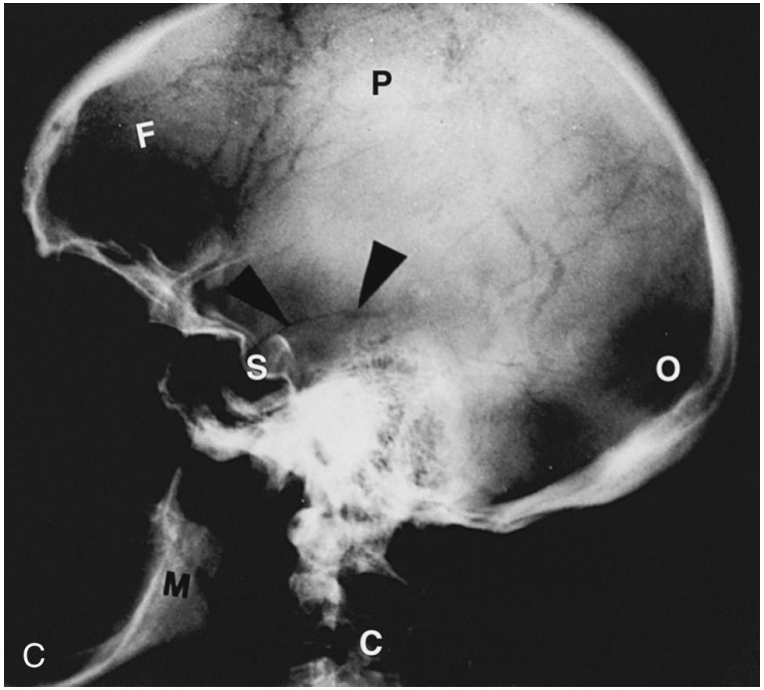
- Sinus Series CI: Sinusitis
- PA and Lat Chest CI: Pneumonia
- SNAT Series CI: Evaluate for Child Abuse
- Bone Age Study CI: FTT (Failure to Thrive)
- LS Spine Series CI: Possible Fracture
- X-ray of the Tibia with Close Attention to the Distal Portion CI: Fracture
- KUB (also called a flat plate of abdomen) CI: General Survey of the Abdomen

# Radiographic (x-ray) Table



# Chest and Skull X-rays



# Informed Consent and Other Forms

- Diagnostic imaging procedures that are invasive and those that require the injection of contrast medium are not performed until the patient has signed an informed consent.
- It is the responsibility of the HUC to prepare the consent form for the patient's signature.
- Special invasive x-ray and interventional procedures also require a signed consent.
- Other diagnostic imaging procedures that require a consent form may vary among health care facilities.

# X-rays that Require Preparation and Contrast Media

- Certain organs and blood vessels within the body are difficult for the radiologist to see because there is little difference in density between them and their surrounding parts.
- To increase the contrast, contrast medium is used. Examples:
  - Barium preparations
  - Air
  - Water
  - Gas
  - Radiopharmaceuticals (nuclear medicine)

# Guidelines for Scheduling X-ray Studies

- X-ray studies of the lower spine and pelvis should be ordered first, before a barium enema or an upper gastrointestinal study is done.
  - The presence of barium in specific parts of the body may obscure the portion of the body that is being studied.
- Abdominal studies that use ultrasound or CT should precede studies that use barium.
- Liver and bone scans and nuclear medicine studies may conflict with barium studies and should be done first.

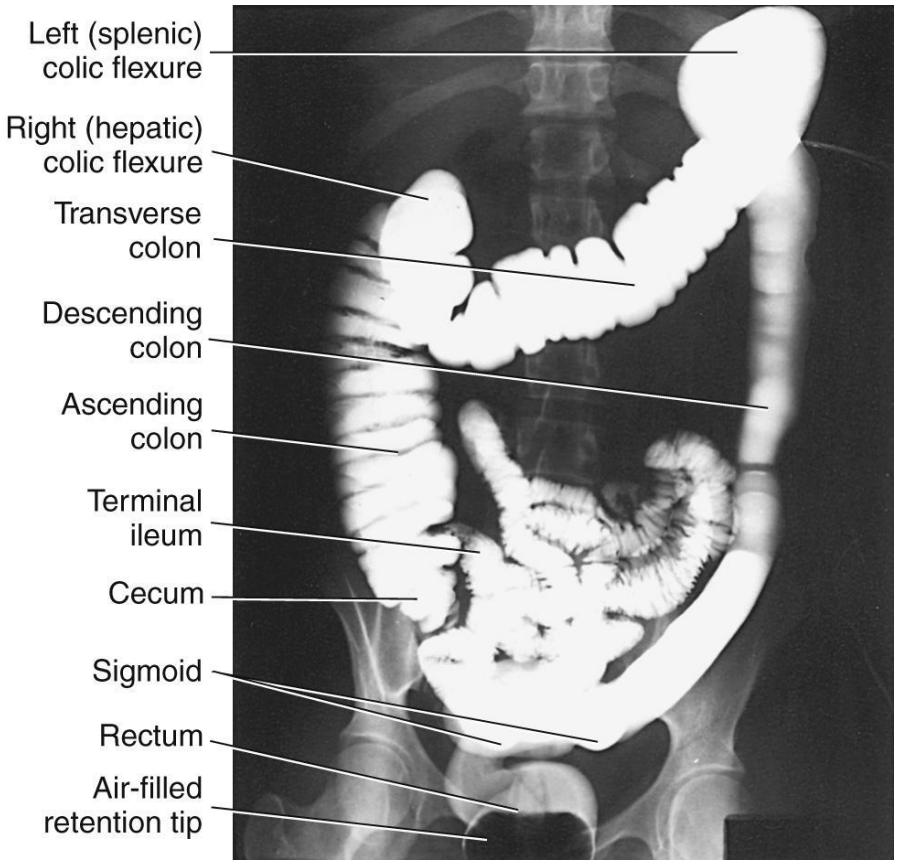
# Guidelines for Scheduling X-ray Studies, cont'd

- Three x-ray studies requiring contrast media frequently are ordered at the same time.
- One or maybe two can be done on the same day; thus, the studies may have to be scheduled three or more days in advance.
  - Order of scheduling:
    - Intravenous urogram (IVU)
    - Barium enema (BE)
    - Upper gastrointestinal (UGI) or UGI and small bowel follow-through (SBFT)

# Diagnostic Imaging that Requires Routine Preparation

- BE (barium enema)
  - Contrast media: barium contrast medium is introduced rectally.
  - Prep: cathartic pm & am before the procedure, low-residue diet (jello, simple broths) eight to 12 hours before the examination, NPO 2400 hours.
- Barium Swallow (Esophagogram)
  - Contrast media: barium solution is given orally.
  - Prep: NPO eight to 12 hours before the procedure

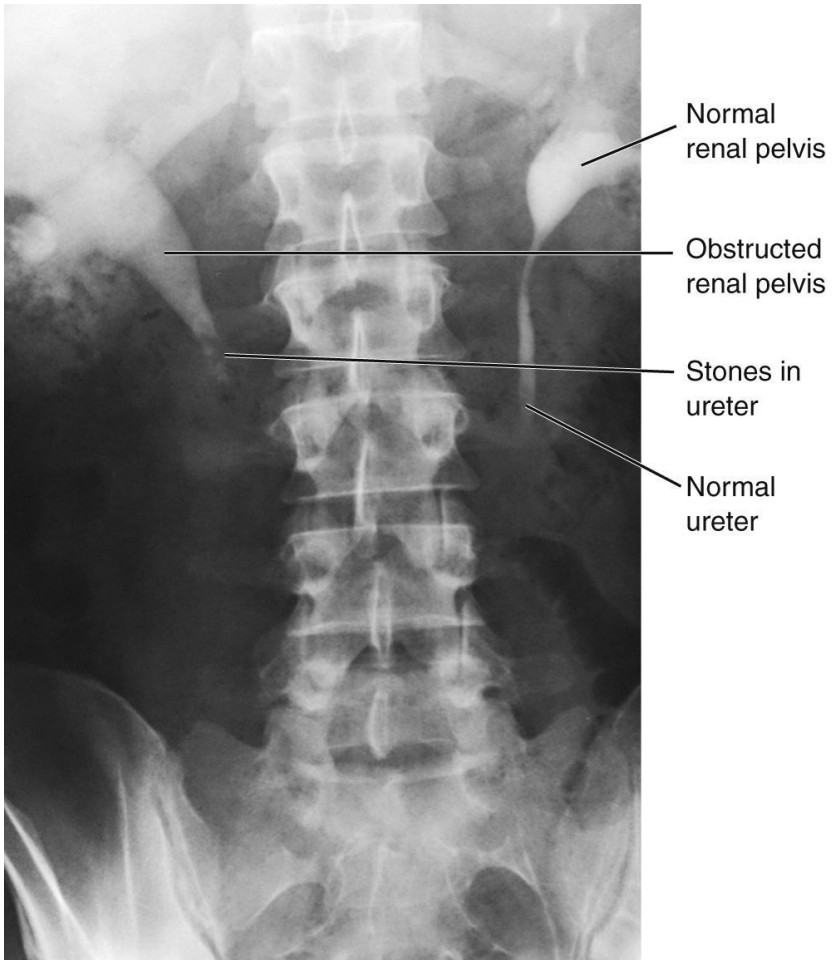
# Barium Enema (BE)



# Diagnostic Imaging that Requires Routine Preparation, cont'd

- IVU (synonymous with IVP)
  - Contrast media: iodinated contrast medium injected into the patient's vein
  - Prep: NPO eight to 12 hours before the procedure is to be performed – some physicians write orders to hydrate the patient before the examination.
- UGI and SBFT
  - Contrast media: barium solution given orally
  - Prep: NPO eight to 12 hours before the procedure

# Intravenous Urogram (IVU)



# Lesson 15.2

## Special Invasive X-ray and Interventional Procedures and Other Types of Diagnostic Imaging

13. Explain the purpose of special invasive x-ray and interventional procedures and list at least three procedures performed in this division of the radiology department.
14. Describe an instruction the doctor would include when ordering computed tomography (CT) and list at least three CT procedures.

# Examples of Special Invasive X-ray and Interventional Doctors' Orders for Procedures

- PTC CI: Obstruction of the Bile Ducts
- Carotid Angiogram CI: Aneurysm
- Lower Abdominal Angiogram CI: Angiodysplasia
- Arthrogram of the Left Knee CI: Torn Ligament
- Cholangiogram, Postoperative (T-Tube Cholangiogram) CI: Retained Stones
- Hysterosalpingogram CI: Obstruction of Fallopian Tubes
- Venogram of Left Leg CI: DVT (Deep Vein Thrombosis)

# Lesson 15.2

## Special Invasive X-ray and Interventional Procedures and Other Types of Diagnostic Imaging (cont'd)

15. Describe the purpose of ultrasonography procedures and list at least three procedures performed in the ultrasonography department.
16. Discuss the purpose of magnetic resonance imaging (MRI) procedures and the purpose of magnetic resonance angiography (MRA) procedures

# Lesson 15.2

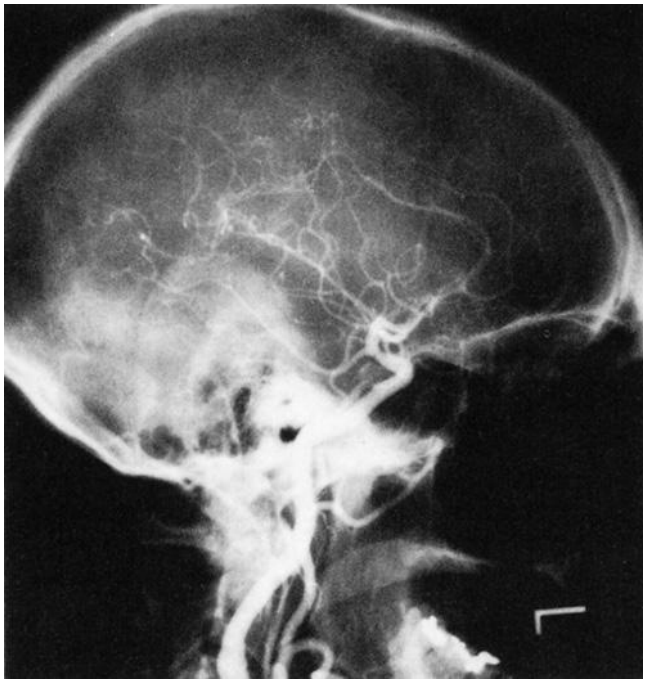
## Special Invasive X-ray and Interventional Procedures and Other Types of Diagnostic Imaging (cont'd)

17. Discuss the importance of a patient's nurse completing the interview form before the patient undergoes MRI or MRA and list contraindications that would exist for patients because of the strength of the magnet.
18. Discuss the purpose of nuclear medicine procedures and list at least three nuclear medicine procedures.

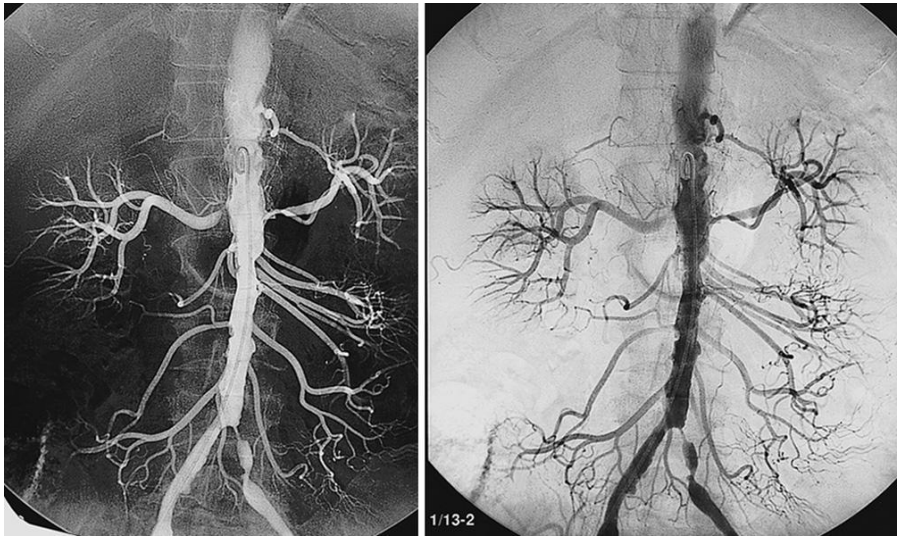
# Special Invasive X-ray and Interventional Procedures

- Performed under the direction of a radiologist or are performed by an interventional radiologist
- Special invasive x-ray and interventional radiology utilizes minimally-invasive image-guided procedures to diagnose and treat diseases in nearly every organ system.
- The interventional radiologist combines expertise in performing procedures with their knowledge of routine diagnostic imaging.

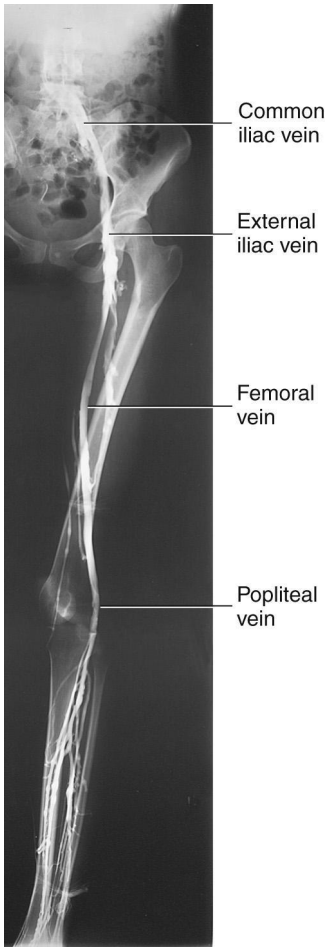
# Carotid Angiogram



# Lower Abdomen Angiogram



# Normal Venogram



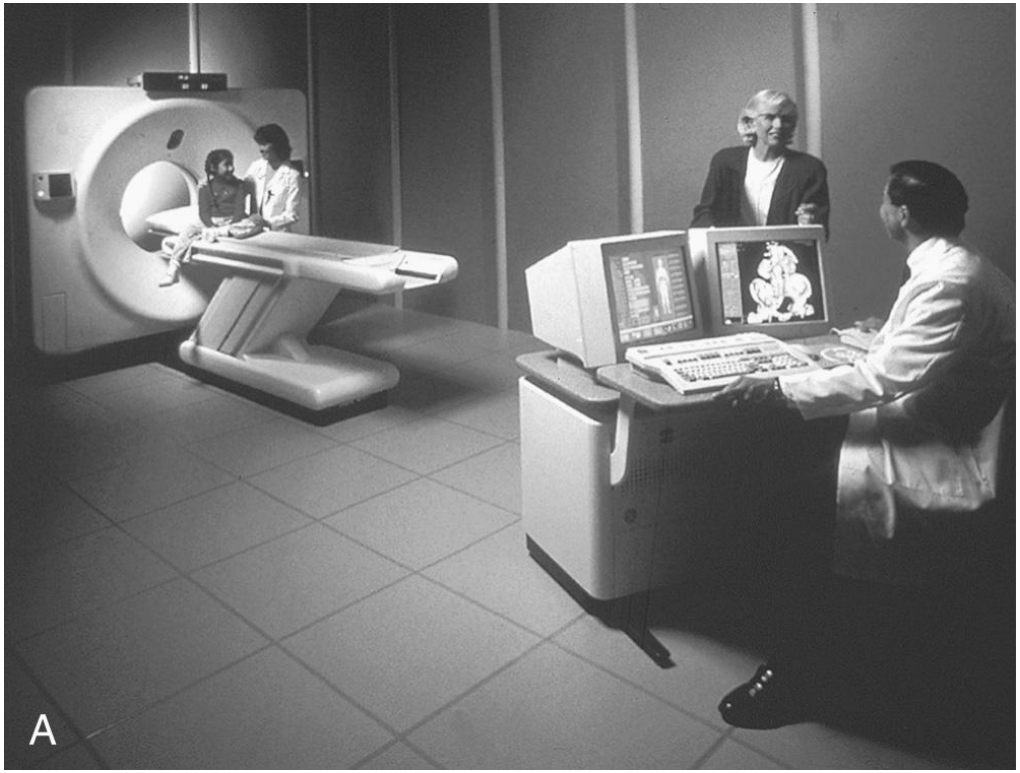
# Computed Tomography (CT)

- Uses a type of ionizing radiation (x-rays) to provide a computerized image that can generate multiple two-dimensional cross sections (slices).
- Spiral, helical and 3-D rendering CT provides three-dimensional reconstructions.

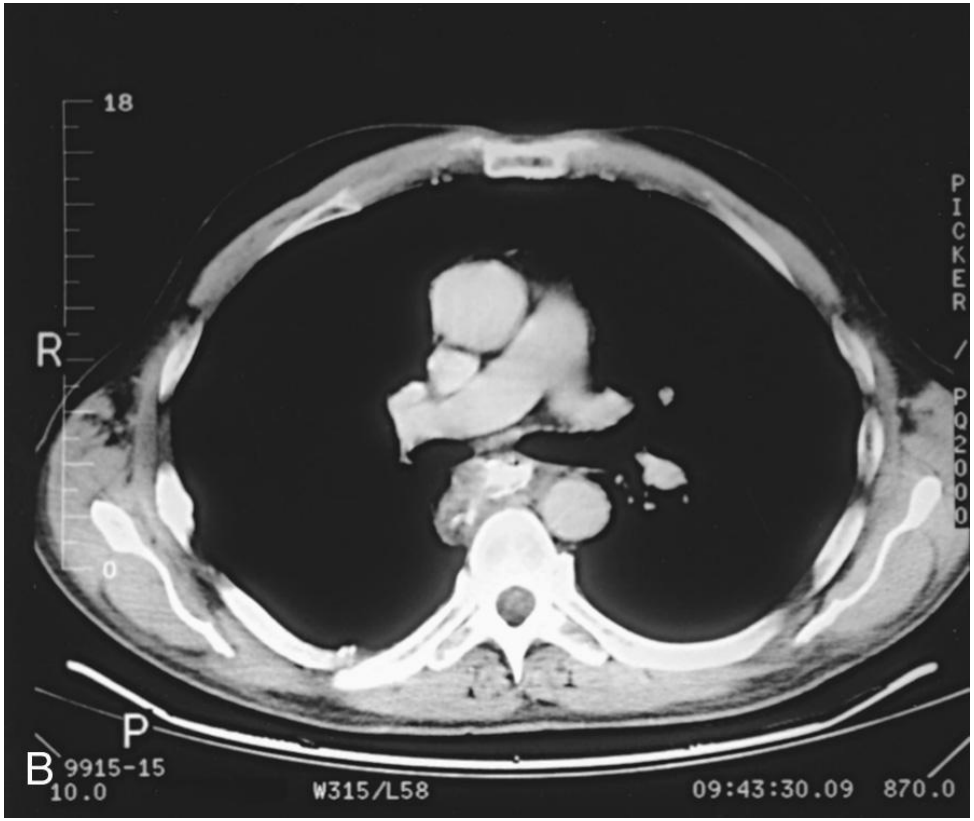
# Computed Tomography (CT) Doctors' Orders for Procedures

- CT of Head DSA CI: Aneurysm
- CT Scan of Abd CI: Evaluate Carcinoma
- CT Scan of the Brain CI: Tumor
- CT Scan of Abdomen and Pelvis CI: Retroperitoneal Lesion
- CT of LS Spine CI: Spinal Stenosis
- CT of the Neck CI: Tumor
- CT of Chest CI: Lung Cancer
- CT-Guided Liver Biopsies

# CT Scanner



# CT Scan of the Chest



# Ultrasonography

- Ultrasonography (also called sonography, ultrasound, or echo)
  - Uses high-frequency sound waves to create an image of body organs
  - Is a technique that is used to visualize muscles, tendons, and many internal organs and to assess their size, structure, and the presence of pathologic lesions

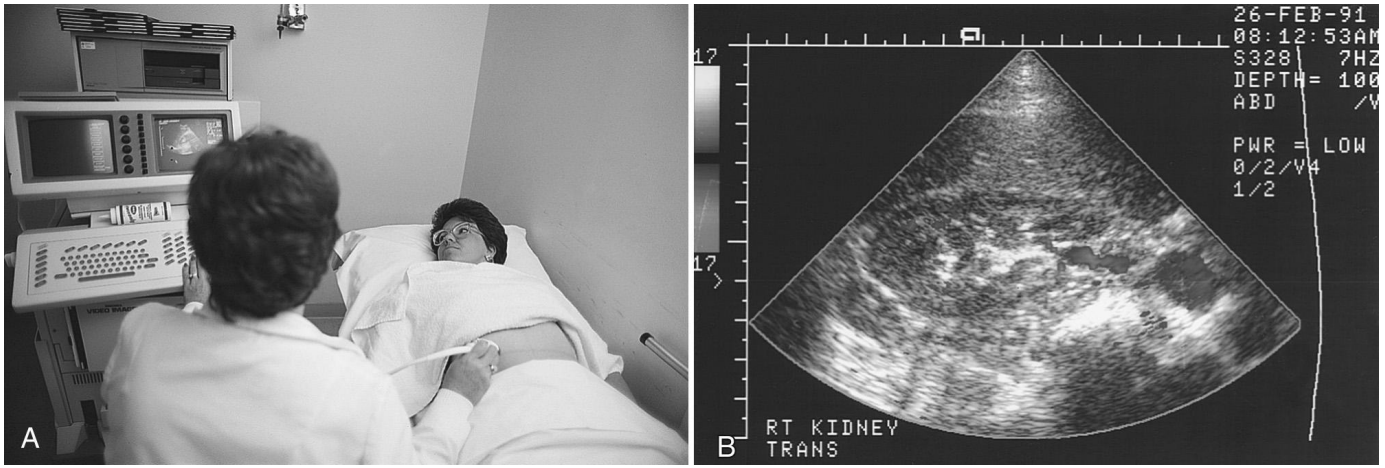
# Ultrasonography, cont'd

- Used to guide procedures such as needle biopsy, in which needles are used to extract sample cells from an abnormal area for laboratory testing, imaging of the breasts, and biopsy sampling for breast cancer
- Used to diagnose a variety of heart and vascular conditions
- Used to survey damage after a heart attack or other illness
- Used to visualize a fetus during routine and emergency prenatal care:
  - To date the pregnancy and to check for the location of the placenta (afterbirth), the presence of multiple fetuses or physical abnormalities, the sex of the baby, and fetal movement, breathing, and heartbeat.

# Ultrasonography Studies

- US of Abd
- US of Pelvis
- US of Kidneys (Renal US)

# Ultrasound Scanner



# Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA)

- Magnetic Resonance Imaging (MRI):
  - A technique for viewing the interior of the body that uses powerful magnetic fields, radio waves, and a computer to produce images of body structures
- Magnetic resonance angiography (MRA):
  - Uses magnetic resonance to study blood vessels
- Contrast medium may or may not be used:
  - Can be as simple as water taken orally
  - Can be substances with specific magnetic properties, such as Gadolinium

# Magnetic Resonance Imaging (MRI) and Magnetic Resonance Angiography (MRA), cont'd

- The HUC, when transcribing MRI or MRA orders, would prepare an interview form for the nurse to complete before sending the patient for an MRI.
- The form lists any contraindications that may prevent the patient from having the procedure.

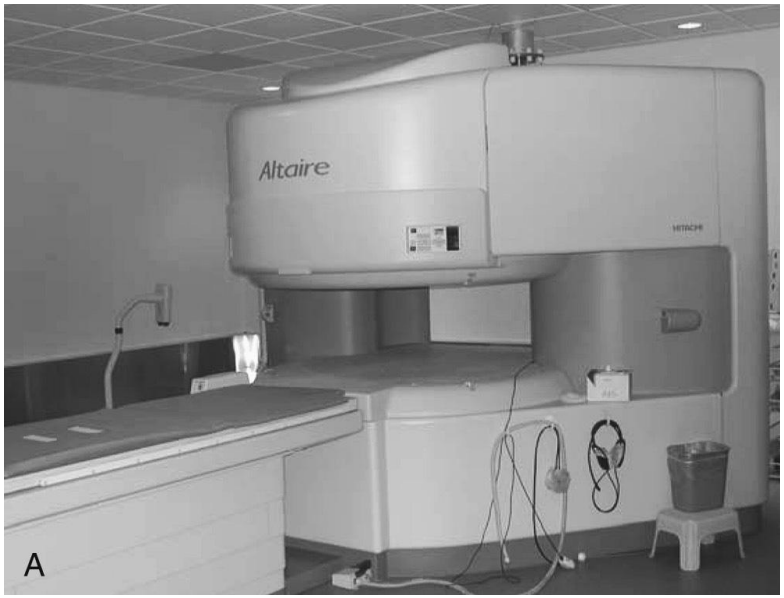
# MRI Contraindications

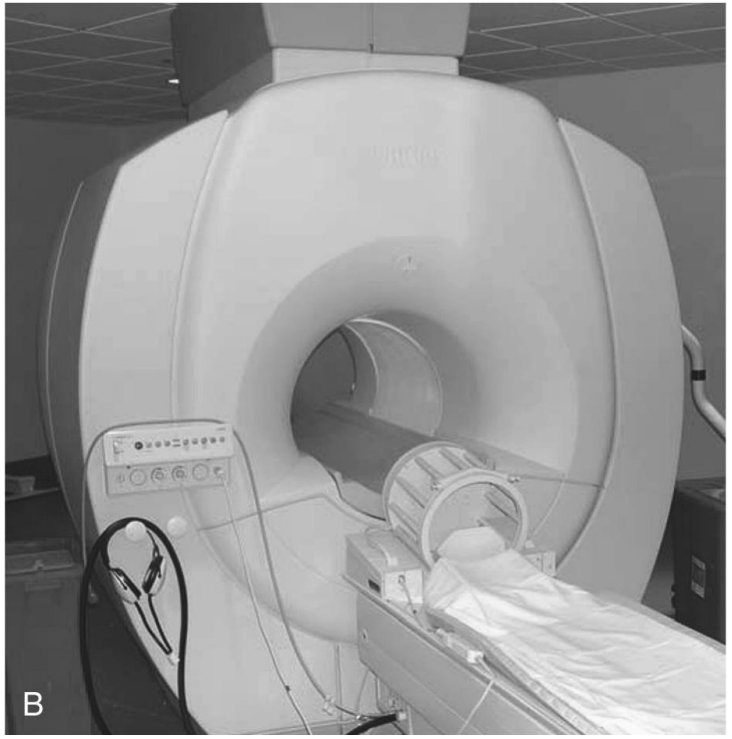
- Pacemaker
- Implanted port device
- Neurostimulator
- Intrauterine device (IUD)
- Insulin pump
- Older metal plates, pins, screws, or surgical staples
- Ear implant
- Older metal clips from aneurysm repair
- Metal clips in eyes
- Retained bullets
- Pregnancy

# Examples of MRI and MRA Medicine Doctors' Orders for Procedures

- MRI of brain and cervical spine CI: malignancy
- MRI lumbar spine CI: back pain and HNP
- MRI rt shoulder CI: rotator cuff injury
- MRI lt knee CI: posterior cruciate ligament tear
- MRA cerebral arteries CI: vertigo with poss arterial stenosis

# Open and Closed MRI Machines



# MRI of Brain

# Nuclear Medicine

- Uses radioactive materials called radiopharmaceuticals to determine the functioning capacity of organs
- Radioactive scanning materials are used to assist in diagnosing disease because of their ability to give off radiation in the form of gamma rays, which can be traced.
- Depending on the study to be performed, the patient may take the radiopharmaceutical by mouth, or it may be injected within a vein.

# Examples of Nuclear Medicine Doctors' Orders for Procedures

- Bone Scan—Total Body CI: Cancer, Prostate-Mets
- Bone Scan—Regional CI: Cervical Fx
- Breast Scintigraphy (Breast Scan, Sestamibi Breast Scan) CI: Breast Cancer
- DISIDA, HIDA OR BRIDA Scans (Cholescintigraphy) CI: Gallstones
- L&S (liver and spleen) Scan CI: Cirrhosis
- Gallium Scan—Total Body CI: Lymphoma (also may be ordered regionally)

# Nuclear Medicine Scanner