Department of Radiology
Division of Diagnostic Radiology
Fellowship : Abdominal imaging

Course description:
Basic principles of various modalities for abdominal imaging and clinical experience in
diagnosis of common diseases.

General objective:
Practice of imaging approach and interpretation with correlation to clinical data.

Learning objective:
At the end of the course, the fellow must be able to
1. describe principles of the following investigative modalities of abdomen.
   1.1 Plain radiography
   1.2 Radiographic contrast study
   1.3 Ultrasonography
   1.4 Computed tomography
   1.5 Magnetic resonance imaging
2. describe indications, contraindications, preparation, complications and management
   of complications in each of the above investigative modalities.
3. describe normal anatomy of abdominal imaging in each type of the above
   investigative modalities.
4. define and differentiate abnormal findings in the common diseases of abdomen in
   each type of the above investigative modalities.
5. select appropriate investigative modalities in evaluation of abdomen.

Learning contents:
1. Plain radiography
   1.1 Radiographic techniques
   1.2 Normal plain radiograph of the abdomen
1.3 Abnormal plain radiograph of the abdomen
   1.3.1 Abnormal bowel pattern
   1.3.2 Abnormal gas
   1.3.3 Abnormal calcification
   1.3.4 Intraperitoneal fluid
   1.3.5 Organomegaly or mass
   1.3.6 Foreign body

2. Radiographic contrast study
   2.1 Alimentary system
      2.1.1 Principles, methods, indications, contraindications, preparations, complications and management of the complications of various radiologic examinations.
         2.1.1.1 Upper gastrointestinal study
         2.1.1.2 Small bowel study
         2.1.1.3 Barium enema
      2.1.2 Normal roentgenographic anatomy and physiology
      2.1.3 Abnormal findings in the contrast study of the alimentary system.
         2.1.3.1 Abnormal collection of contrast medium
         2.1.3.2 Filling defect
         2.1.3.3 Stenotic lesion
         2.1.3.4 Dilated lesion
         2.1.3.5 Alteration of mucosal pattern
         2.1.3.6 Abnormal position
      2.1.4 Common diseases of the alimentary system.
         2.1.4.1 Congenital anomaly
         2.1.4.2 Ulceration
         2.1.4.3 Tumors
         2.1.4.4 Inflammation
         2.1.4.5 Trauma
         2.1.4.6 Miscellaneous
2.2 KUB system

2.2.1 Principles of various uroradiological examinations using contrast media including techniques, indications, contraindications, limitations, complications and management of complications.

2.2.1.1 Excretory urography
2.2.1.2 Nephrotomography
2.2.1.3 Retrograde pyelography
2.2.1.4 Cystography including voiding cystourethrography
2.2.1.5 Urethrography including retrograde urethrography

2.2.2 Renal physiology of urographic contrast media.

2.2.3 Normal roentgenographic anatomy and physiology of various uroradiological examinations.

2.2.4 Abnormal roentgenographic findings in common diseases.

2.2.4.1 Congenital anomaly
2.2.4.2 Obstructive uropathy
2.2.4.3 Infection
2.2.4.4 Trauma or urinary tract injury
2.2.4.5 Tumor

3. Ultrasonography

3.1 Principle and clinical application of ultrasound in evaluation of the abdomen.

3.1.1 Physics of ultrasound
3.1.2 Biologic effects and safety
3.1.3 Ultrasound instrumentation
3.1.4 Real-time ultrasound
3.1.5 Doppler ultrasound

3.2 Examination techniques.

3.3 Abdominal and pelvic sonography.

3.3.1 Normal anatomy and echogenicity.

3.3.1.1 The hepatobiliary system
3.3.1.2 The gastrointestinal tract
3.3.1.3 The urinary tract
3.3.1.4 Adrenal glands
3.3.1.5 Retroperitoneum
3.3.1.6 Abdominal great vessels
3.3.1.7 Prostate gland
3.3.1.8 Uterus and adnexa
3.3.2 Doppler assessment of intra-abdominal vessels
3.3.3 Common pathological conditions.
  3.3.3.1 Developmental anomalies
  3.3.3.2 Congenital abnormalities
  3.3.3.3 Infectious diseases
  3.3.3.4 Metabolic disorders
  3.3.3.5 Vascular abnormalities
  3.3.3.6 Neoplasm
  3.3.3.7 Trauma

4. Computed tomography
  4.1 Principle and clinical application of computed tomography in abdominal evaluation.
  4.2 Examination techniques for imaging of the abdomen and pelvis.
  4.3 Normal imaging anatomy.
    4.3.1 Hepatobiliary system
    4.3.2 Gastrointestinal system
    4.3.3 Urinary system
    4.3.4 Adrenal glands
    4.3.5 Peritoneum and mesentery
    4.3.6 Retroperitoneum
    4.3.7 Abdominal great vessels
    4.3.8 Pelvis
  4.4 Common pathological disorders.
4.4.1 Developmental anomalies
4.4.2 Congenital abnormalities
4.4.3 Infectious diseases
4.4.4 Metabolic disorders
4.4.5 Vascular abnormalities
4.4.6 Neoplasm
4.4.7 Trauma

5. Magnetic resonance imaging

5.1 Basic principles and clinical application.

5.1.1 Physics
5.1.2 Image contrast mechanism
5.1.3 Flow, motion and artifacts and compensation
5.1.4 Instrumentation
5.1.5 Imaging contrast agents

5.2 Examination techniques for imaging of the abdomen and pelvis.

5.3 Normal anatomy.

5.3.1 Hepatobiliary system
5.3.2 Gastrointestinal system
5.3.3 Urinary system
5.3.4 Adrenal glands
5.3.5 Retroperitoneum
5.3.6 Abdominal great vessels
5.3.7 Pelvis

5.4 Common pathological disorders.

5.4.1 Developmental anomalies
5.4.2 Congenital abnormalities
5.4.3 Infectious diseases
5.4.4 Metabolic disorders
5.4.5 Vascular abnormalities
5.4.6 Neoplasm
5.4.7 Trauma

**Learning process:**

1. Lectures
2. Conferences
3. Journal clubs
4. Seminars
5. Practices and consultations: Plain film interpretation, GI contrast studies, ultrasound, CT, MRI and angiography.
6. Researches: at least one research project.

**Evaluation:**

1. Knowledge and attitude in consultation and service.
2. Practical efficiency.
3. Research project quality
Department of Radiology
Division of Diagnostic Radiology
Fellowship: Neuroradiology

Course description:
Principles of advanced diagnostic imaging of the central nervous system

General objectives:
Practice of neuroimaging and interpretation with correlation to clinical data.

Learning objective:
At the end of the course, the fellow must be able to
1. describe indications, contraindications, preparations, complications and management
   of complications of various neuroimaging procedures
   1.1 Conventional radiology
   1.2 Myelography
   1.3 Angiography: Conventional angiography
       : Digital subtraction angiography (DSA)
   1.4 Ultrasonography
   1.5 Computed tomography
   1.6 Magnetic resonance imaging
   1.7 Other relating techniques in Nuclear Medicine
2. Select appropriate imaging procedures
3. define principles and clinical applications of medical imaging procedures
   3.1 Conventional radiology
   3.2 Myelography
   3.3 Angiography: Conventional angiography
       : Digital subtraction angiography (DSA)
   3.4 Ultrasonography
   3.5 Computed tomography
   3.6 Magnetic resonance imaging
3.7 Other relating techniques in Nuclear Medicine
4. describe normal anatomy and variations of neuroimagings
5. describe and interpret abnormal findings in neuroimagings
6. describe indications, contraindications, preparations, complications and management of complications of interventional neuroradiology

Learning contents:

1. Techniques and projections for radiographic examinations of the followings
   1.1 Skull : Routine and special projections
   1.2 Spine
2. Principles of plain film interpretation of the skull and spine
   2.1 Normal roentgenographic findings and variations of the skull and spine
   2.2 Abnormal roentgenographic findings of the skull
   2.3 Abnormal roentgenographic findings of the spine
3. Special neuroradiological investigations and advanced neuroimagings
   3.1 Myelography
      3.1.1 Indications, contraindications, limitations, complications and management of complications
      3.1.2 Technique and choice of contrast media
      3.1.3 Normal roentgen anatomy
      3.1.4 Abnormal myelographic findings
   3.2 Digital subtraction cerebral angiography
      3.2.1 Indications, contraindications, limitations, complications and management of complications
      3.2.2 Principle of DSA
      3.2.3 Instruments, technique and contrast media
         - Seldinger’s technique via femoral and axillary punctures
         - Direct carotid puncture
         - Retrograde brachial angiography
         - Selective cerebral angiography
3.3 Digital subtraction spinal angiography
   3.3.1 Indications, contraindications, limitations, complications and management of complications
   3.3.2 Instruments, techniques and contrast media
   3.3.3 Normal roentgen anatomy and variations
   3.3.4 Abnormal findings in spinal angiogram

3.4 Ultrasonography
   3.4.1 Principle of ultrasonography
   3.4.2 Indications and limitations of ultrasonography
   3.4.3 Instruments and techniques
   3.4.4 Normal imaging anatomy of the neonatal brain, spine and spinal cord
   3.4.5 Interpretation of abnormal findings in ultrasonography of the neonatal brain, spine and spinal cord
   3.4.6 Color Doppler ultrasound of the carotid and intracranial arteries

3.5 Computed tomography (CT scan) and computed tomography angiography (CTA)
   3.5.1 Principle of computed tomography
      - Conventional
      - Spiral CT
   3.5.2 Indications, contraindications, limitations, complications and management of complications
   3.5.3 Techniques and contrast media
   3.5.4 Normal imaging anatomy of the skull, intracranial content, cervical Vessels, cerebral vessels, spine and spinal content
   3.5.5 Abnormal findings in CT scan
3.6 Magnetic resonance imaging (MRI), magnetic resonance angiography (MRA), magnetic resonance spectroscopy (MRS), functional MRI (diffusion, Perfusion, brain activation) and advanced MRI techniques.

3.6.1 Principle of each modality
3.6.2 Indications, contraindications, and limitations
3.6.3 Techniques and contrast media
3.6.4 Normal imaging anatomy
3.6.5 Abnormal findings in MRI

3.7 Interventional neuroradiology

3.7.1 Principle and methodology of endovascular access
3.7.2 Complications related to endovascular access
3.7.3 Principles of endovascular treatment of
   3.7.3.1 Intracranial aneurysm
   3.7.3.2 Intracranial arteriovenous malformation
   3.7.3.3 Dural arteriovenous fistula
   3.7.3.4 Carotid – cavernous fistula
   3.7.3.5 Spinal vascular malformation
   3.7.3.6 Extracranial and intracranial arterial stenosis
   3.7.3.7 Thrombolysis

Learning process:

1. practice and interpret undersupervision of attending staff of the following neuroimaging :- Conventional radiography, Angiography, Myelography, Computed tomography and Magnetic resonance imaging and Ultrasonography
2. participate and responsible in the activities related to neuroradiology, i.e., journal club, seminars, topic review, neuroradiology – neurology – neurosurgery conference, cranio – facial conference, radiology – ENT conference and radiopathological conference
3. be consultant for medical students and residents in neuroradiology
4. propose and execute at least one research project relating neuroradiology
**Evaluation**

Examination and observation, of the following:

1. knowledge in neuroradiology.
2. efficiency in neuroradiological practice.
3. attitude in neuroradiological practice.
4. quality of research project.

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Department of Radiology
Division of Diagnostic Radiology
Fellowship : Diagnostic CT and MR imagings

Course description :
Principles of computed tomography (CT Scan), magnetic resonance imaging (MRI) and clinical experience in diagnosis of common diseases

General objective :
Practice of imaging approach and interpretation with correlation to clinical data

Learning objectives :
At the end of the course, the fellow must be able to
1. describe principles of computed tomography and magnetic resonance imaging.
2. describe indications, contraindications, preparations, complications and management of complications of various investigations by CT and MRI.
3. define clinical applications and select appropriate CT and MR imagings.
4. describe and identify normal CT and MR imaging anatomy.
5. describe and differentiate abnormal CT and MR findings in various diseases with correlation to conventional plain radiograph and clinical data.

Learning contents :
1. Physics and techniques of the followings.
   1.1 Conventional CT
      1.1.1 Technical principles
   1.2 Spiral CT
      1.2.1 Technical principles and parameters of data acquisition.
      1.2.2 Principles of image reconstruction
      1.2.3 Image quality
      1.2.4 Patient dose considerations
      1.2.5 Advanced imaging techniques
1.3 Contrast media in CT

1.4 Magnetic resonance imaging
   1.4.1 Basic principles
   1.4.2 Image weighting and contrast
   1.4.3 Encoding and image formation
   1.4.4 Parameters and trade-offs
   1.4.5 Pulse sequences
   1.4.6 Flow phenomenon
   1.4.7 Artifacts and their compensation
   1.4.8 Vascular and cardiac imaging
   1.4.9 Instrument and equipment
   1.4.10 MRI safety
   1.4.11 Contrast agents in MRI
   1.4.12 Advanced imaging technique

2. Principles of interpretation of
   2.1 Conventional CT
   2.2 Spiral CT and advanced techniques
   2.3 MRI, MRA (magnetic resonance angiography) and advanced techniques.

3. Normal anatomical findings of the whole body demonstrated by CT and MRI

4. Abnormal findings in common disorders concerning congenital malformation, trauma, inflammation, neoplasm and degenerative disease of the following systems.
   4.1 Nervous system
   4.2 Respiratory system
   4.3 Gastrointestinal system
   4.4 Hepatobiliary system
   4.5 Urogenital system
   4.6 Musculoskeletal system
Learning process:
1. be consultant for medical students and residents concerning CT and MR imagings.
3. medical practice undersupervision of attending staff in CT and MRI units.
4. propose and execute at least one research project relating CT or MRI.

Evaluation:
1. knowledge and attitude in consultation and service.
2. practical efficiency.
3. research project quality.
Department of Radiology
Division of Diagnostic Radiology
Fellowship : Interventional Radiology

Course description :
Basic principles of angiography, interventional radiology, clinical experience and Practices in vascular and interventional radiology

General objective :
Practice of vascular and interventional radiology

Learning objective :
At the end of the course, the fellow must be able to
1. describe indications, contraindications, preparations, complications and management of complications of vascular and interventional radiologic procedures.
2. perform and interprete diagnostic procedures of vascular radiology.
3. perform common procedures of body interventional radiology.
4. describe principles of advance procedures of interventional radiology.

Learning contents :
1. Principles of diagnostic vascular radiology
   1.1 Cerebral angiography
   1.2 Thoracic and abdominal aortography and selective angiography
   1.3 Peripheral angiography
   1.4 Venography

   2.1 Vascular interventional radiology.
      2.1.1 Embolotherapy
      2.1.2 Thrombolytic therapy
      2.1.3 Percutaneous transluminal angioplasty
      2.1.4 Vascular stent
2.1.5 Percutaneous retrieval or intravascular foreign bodies
2.1.6 Miscellaneous

2.2 Nonvascular interventional radiology.
   2.2.1 Biliary intervention
   2.2.2 Urinary intervention
   2.2.3 GI intervention
   2.2.4 Fine needle aspiration biopsy
   2.2.5 Management of intraabdominal abscess and fluid collection
   2.2.6 Miscellaneous

Learning process:
1. Lecture and small group discussion
   1.1 Staff and guest lectures
   1.2 Journal club and seminars
   1.3 Topic review
   1.4 Vascular and interventional radiologic conference

2. Clinical practices
   2.1 Consultation in vascular and interventional radiology
   2.2 Performing procedures of vascular and interventional radiology
      3 days/week

Minimal requirement of performance:
- Transhepatic oilschemoembolization (TOCE) 10 cases
- Percutaneous transhepatic biliary drainage (PTBD) 5 cases
- Percutaneous nephrostomy (PCN) 2 cases
- Percutaneous drainage (PCD) 5 cases
- Fine needle aspiration (FNA) 20 cases
- Angioplasty 1 case
- Embolization (other than TOCE) 5 cases
- Assist Transjugular intrahepatic portosystemic shunt (TIPS) 1 case
- Assist biliary stent 1 case
2.3 Follow up OPD – half day/week
2.4 OPD film reading – half day/week
2.5 On call for emergency case of vascular and interventional radiology 3-4 days/week
2.6 Others
3. Research project relating interventional radiology
4. Elective to outside institute for 2 weeks

**Evaluation** :

1. Practical knowledge of vascular and interventional radiology during training.
2. Atitude and responsibility.
3. Research work quality.

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Department of Radiology
Division of Diagnostic Radiology
Fellowship : Diagnostic Ultrasonography

Course description :
Basic principle of ultrasound, and clinical experience in diagnosis of common diseases

General objective :
Practice of imaging approach and interpretation with correlation to clinical data

Learning objectives :
At the end of the course, the fellow must be able to

1. describe the basic principles, physics and fundamental techniques of ultrasonography and Color Doppler imaging.
2. describe the indications and preparations of the ultrasonography of abdomen, brain, thorax, small part and Color Doppler of peripheral vessels and intra-abdominal vessels.
3. describe and identify normal ultrasonographic anatomy of abdomen, brain, thorax, small part, intra-abdominal vessels and peripheral vessels.
4. describe and differentiate abdominal ultrasonographic findings in various diseases.

Learning contents :

1. Basic principles of ultrasonography and Color Doppler imaging
   1.1 Physics of ultrasound and Color Doppler imaging
   1.2 Ultrasound instrumentation
   1.3 Biologic effects and safety
   1.4 Performance and use
2. Techniques, indications and preparation of ultrasonography and Color Doppler imaging of
   2.1 abdomen
   2.2 brain
2.3 thorax

2.4 small part

2.5 musculoskeletal system

2.6 peripheral vessels

2.7 intra-abdominal vessels

3. Normal ultrasonographic anatomy

3.1 Abdominal organs

3.1.1 Hepatobiliary system, pancreas and spleen

3.1.2 Gastro-intestinal tract

3.1.3 Urinary system

3.1.4 Prostate gland

3.1.5 Adrenal glands and retroperitoneum

3.1.6 Uterus and ovary

3.1.7 Abdominal vessels

3.1.8 Miscellaneous :- Abdominal wall, diaphragm, peritoneum

3.2 Brain and ventricles

3.3 Thorax

3.4 Small parts

3.4.1 Thyroid gland

3.4.2 Parathyroid glands

3.4.3 Salivary glands

3.4.4 Breasts

3.4.5 Scrotum

3.5 Musculoskeletal system (muscles, tendons, joints)

3.6 Peripheral vessels

3.6.1 Extracranial carotid system

3.6.2 Vessels of the upper and lower extremities

3.7 Obstetric sonography (fetus, placenta, umbilical cord)

4. Abnormal ultrasonographic features in various diseases.
4.1 Hepatobiliary system

4.1.1 Liver

4.1.1.1 Cysts

4.1.1.2 Infectious diseases

4.1.1.2.1 Viral hepatitis

4.1.1.2.2 Bacteria

4.1.1.2.3 Fungus (Candidiasis)

4.1.1.2.4 Parasites

4.1.1.3 Disorders of metabolism

4.1.1.3.1 Fatty liver

4.1.1.3.2 Glycogen storage disease

4.1.1.3.3 Cirrhosis

4.1.1.4 Neoplasms

4.1.1.4.1 Benign

4.1.1.4.2 Malignant

4.1.1.5 Trauma

4.1.1.6 Vascular abnormalities

4.1.1.6.1 Portal hypertension

4.1.1.6.2 Portal vein thrombosis

4.1.1.6.3 Intrahepatic portosystemic venous shunts

4.1.1.6.4 Hepatic artery aneurysm and pseudoaneurysm

4.1.1.6.5 Budd-Chian Syndrome

4.1.1.7 Post hepatic surgery

4.1.1.7.1 Liver transplantation

4.1.1.7.2 Portosystemic shunts

4.1.2 Gallbladder

4.1.2.1 Cholelithiasis

4.1.2.2 Polyp
4.1.2.3 Carcinoma

4.1.2.4 Cholecystitis
   4.1.2.4.1 Acute cholecystitis
   4.1.2.4.2 Chronic cholecystitis
   4.1.2.4.3 Emphysematous cholecystitis
   4.1.2.4.4 Gangrenous cholecystitis
   4.1.2.4.5 Perforation

4.1.2.5 Wall changes

4.1.3 Bile ducts
   4.1.3.1 Dilated intrahepatic bile ducts
      4.1.3.1.1 Neoplasm
      4.1.3.1.2 Sclerosing and AIDS cholangitis
      4.1.3.1.3 Intrahepatic biliary calculi
      4.1.3.1.4 Caroli’s disease
   4.1.3.2 Extrahepatic bile ducts obstruction
      4.1.3.2.1 Neoplasm
      4.1.3.2.2 Calculi
      4.1.3.2.3 Strictures
      4.1.3.2.4 Parasites

4.1.3.3 Choledochal cyst

4.2 Pancreas
   4.2.1 Pancreatitis and complications
   4.2.2 Neoplasms
      4.2.2.1 Benign
      4.2.2.2 Malignant
   4.2.3 Congenital anomaly

4.3 Spleen
   4.3.1 Splenomegaly
   4.3.2 Cyst
   4.3.3 Neoplasms
4.3.3.1 Binign
4.3.3.2 Malignant
4.3.4 Trauma (hematoma, rupture)
4.3.5 Acquired immune deficiency syndrome (AIDS)

4.4 Gastrointestinal tract
4.4.1 Neoplasms
4.4.2 Inflammation
   4.4.2.1 Acute appendicitis and abscess
   4.4.2.2 Acute diverticulitis
   4.4.2.3 Colitis
4.4.3 Obstruction
   4.4.3.1 Congenital hypertrophic pyloric stenosis
   4.4.3.2 Intussusception

4.5 Urinary system
4.5.1 Kidneys
   4.5.1.1 Cystic renal diseases
   4.5.1.2 Solid renal masses
   4.5.1.3 Infection
   4.5.1.4 Congenital abnormalities
   4.5.1.5 Trauma
   4.5.1.6 Obstruction
   4.5.1.7 Renal failure
   4.5.1.8 Renal vascular diseases
   4.5.1.9 Transplanted kidney

4.5.2 Ureters
   4.5.2.1 Ureterocele
   4.5.2.2 Megaureter
   4.5.2.3 Obstruction

4.5.3 Urinary bladder
   4.5.3.1 Neoplasms
4.5.3.2 Cystitis
4.5.3.3 Bladder outlet obstruction
4.5.3.4 Trauma
4.5.3.5 Congenital anomalies
4.5.4 Urethra
4.6 Prostate gland
4.6.1 Benign condition
4.6.2 Cancer
4.7 Adrenal glands
4.7.1 Adrenal mass
4.7.2 Hemorrhage
4.7.3 Infection
4.7.4 Adrenal hyperplasia
4.8 Retroperitoneum
4.8.1 Neoplasm
4.8.2 Hemorrhage
4.8.3 Infection
4.8.4 Retroperitoneal fibrosis
4.9 Uterus and adnexa
4.9.1 Uterus
4.9.1.1 Congenital abnormalities
4.9.1.2 Abnormality of myometrium
4.9.1.3 Abnormality of endometrium
4.9.1.4 Abnormality of cervix
4.9.2 Vagina
4.9.3 Ovary
4.9.3.1 Nonneoplastic lesions
4.9.3.2 Neoplasms
4.9.4 Fallopian tube
4.9.4.1 Pelvic inflammatory diseases
4.9.4.2 Carcinoma

4.10 Abdominal great vessels
   4.10.1 Aorta and branches
      4.10.1.1 Aneurysm
      4.10.1.2 Dissection
      4.10.1.3 Thrombosis
      4.10.1.4 Graft
   4.10.2 Inferior vena cava and branches
      4.10.2.1 Congenital anomalies
      4.10.2.2 Extrinsic mass
      4.10.2.3 Intrinsic mass

4.11 Brain and spinal canal
   4.11.1 Brain
      4.11.1.1 Congenital anomalies
      4.11.1.2 Hydrocephalus
      4.11.1.3 Hemorrhage
      4.11.1.4 Periventricular leukomalacia
      4.11.1.5 Infection
      4.11.1.6 Intracranial mass
      4.11.1.7 Galenic venous malformation
   4.11.2 Spinal canal
      4.11.2.1 Tethered spinal cord
      4.11.2.2 Hydromyelia
      4.11.2.3 Diastematomyelia
      4.11.2.4 Myelomingecele

4.12 Miscellaneous
   4.12.1 Abdominal wall
      4.12.1.1 Cutaneous lesions
      4.12.1.2 Hernias
      4.12.1.3 Rectal sheath hematoma
4.12.1.4 Fluid collection
4.12.1.5 Vascular lesions
4.12.1.6 Neoplasms

4.12.2 Peritoneum and diaphragm
4.12.2.1 Peritoneum
  4.12.2.1.1 Ascites
  4.12.2.1.2 Abscess
  4.12.2.1.3 Lymphoceles
  4.12.2.1.4 Omental and mesenteric cysts
  4.12.2.1.5 Neoplasms

4.12.2.2 Diaphragm
  4.12.2.2.1 Paralysis
  4.12.2.2.2 Hernia
  4.12.2.2.3 Rupture
  4.12.2.2.4 Neoplasms

4.13 Thorax
4.13.1 Pleural space
  4.13.1.1 Pleural fluid
  4.13.1.2 Pleural thickening and pleural masses
  4.13.1.3 Pneumothorax

4.13.2 Lung parenchyma
4.13.3 Consolidation and atelectasis
4.13.4 Lung tumor
4.13.5 Lung abscess

4.14 Small parts
4.14.1 Thyroid
  4.14.1.1 Nodular thyroid disease
  4.14.1.2 Diffuse thyroid disease

4.14.2 Parathyroid gland (adenoma)

4.14.3 Salivary glands
4.14.3.1 Inflammation
4.14.3.2 Neoplasms

4.14.4 Breast
4.14.4.1 Cyst
4.14.4.2 Solid masses
   4.14.4.2.1 Benign
   4.14.4.2.2 Malignant
4.14.4.3 Trauma and post operation

4.15.5 Scrotum
4.15.5.1 Scrotal mass
4.15.5.2 Acute scrotal condition
4.15.5.3 Trauma
4.15.5.4 Cryptorchidism

4.15 Musculoskeletal system
4.15.1 Trauma
4.15.2 Inflammation
4.15.3 Neoplasms

4.16 Peripheral vessels
4.16.1 Extracranial cerebral vessels: carotid artery, vertebral artery and Internal jugular vein
   4.16.1.1 Occlusion and stenosis
   4.16.1.2 Subclavian steal
   4.16.1.3 Thrombosis

4.17 Obstetric sonography
4.17.1 Ectopic pregnancy
4.17.2 Fetal abnormality
4.17.3 Fetal death
4.17.4 Placenta abnormality
4.17.5 Amniotic fluid
4.17.6 Umbilical cord
Learning process:
1. be consultant for medical students and residents in ultrasonography
2. participate and responsible in the activities related to diagnostic ultrasonography, i.e.,
   journal club, seminars, topic review, CPC, radiopathological conference
3. medical practice undersupervision of attending staff in the following units :
   out-patient ultrasound, in-patient ultrasound and plain radiograph interpretation
4. propose and execute at least one research project relating ultrasonography or
   ultrasound imaging

Evaluation:
1. knowledge and attitude in consultation and service
2. practical efficiency
3. research project quality

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