

UNDERGRADUATE TEACHING

RADIODIAGNOSIS & IMAGING

i) **GOAL:**

The broad goal of teaching the undergraduate medical students in the field of Radio-diagnosis should be aimed at making the students realize the basic need of various radio-diagnostic tools in medical practice. They should be aware of the techniques required to be undertaken in different situations for the diagnosis of various ailments as well as during prognostic estimations.

ii) **OBJECTIVES**

a. **KNOWLEDGE:**

The student should be able to:

1. Understand basics of X-ray production, its uses and hazards.
2. Appreciate and diagnose changes in bones - like fractures, infections, tumors and metabolic bone diseases.
3. Identify and diagnose various radiological changes in disease conditions of chest and mediastinum, skeletal system, G.I. Tract, Hepatobiliary system and G.U. system.
4. Learn about various imaging techniques, including isotopes C.T., Ultrasound, M.R.I. and D.S.A.

b. **SKILL**

At the end of the course the student should be able to:

1. Use basic protective techniques during various imaging procedures.
2. Interpret common X-ray, radio-diagnostic techniques in various community situations.
3. Advise appropriate diagnostic procedures in specialized circumstances to appropriate specialists.

During third to ninth semesters, clinical postings of three hours duration daily as specified in the Table is suggested for various departments, after Introductory Course in Clinical Methods in Medicine and Surgery of two weeks each for the whole class.

Subjects	3 rd Semester (Wks)	4 th Semester (Wks)	5 th Semester (Wks)	6 th Semester (Wks)	7 th Semester (Wks)	8 th Semester (Wks)	9 th Semester (Wks)	Total (wks)
General*** Medicine	6	-	4	-	4	6	6	26
Paediatrics	-	2	-	2	2	4	-	10
Tuberculosis And Chest Diseases	-	2	-	-	-	-	-	02
Skin & STD	-	2	-	2	-	2	-	06
Psychiatry	-	-	2	-	-	-	-	02
Radiology*	-	-	-	-	2	-	-	02
General **** Surgery	6	-	4	-	4	6	6	26
Orthopaedics**	-	-	4	4	-	-	2	10
Ophthalmology	-	4	-	4	-	-	2	10
Ear Nose And Throat	-	4	-	4				08
Obstetrics and Gynaecology***** including Family Welfare Planning	2	4	4	-	4	4	6	24
Community Medicine	4	4	-	4	-	-	-	12
Casualty	-	-	-	2	-	-	-	02
Dentistry	-	-	-	-	2	-	-	02
Total (in Weeks)	18	22	18	22	18	22	22	142

Clinical methods in Medicine and Surgery for whole class will be for 2 weeks each respectively at the start of 3rd semester.

This posting includes training in Radio diagnosis and Radiotherapy where existent.

** This posting includes exposure to Rehabilitation and Physiotherapy.

*** This posting includes exposure to laboratory medicine and infectious diseases.

**** This posting includes exposure to dressing and Anesthesia

***** This includes maternity training and Family medicine and the 3rd semester posting shall be in Family Welfare Planning.

Proposed Post -Graduate Program

M.D. (RADIO-DIAGNOSIS)

GOAL: - The broad goal of the teaching & training of Post-graduate student in Radio-Diagnosis is to make them understand & implement the knowledge regarding the role of various imaging modalities, helpful in the management of different clinical conditions. At the end of his/her training, he/she should be capable to take up a career in teaching institution or in diagnostic center or in research.

OBJECTIVES:-

a) Knowledge: - At the end of the course the student shall be able to:

- 1) Explain the interaction of tile X-rays with mater to produce an image.
- 2) Familiarize with the principles of various imaging modalities (e.g. .US/CT/MRI) & their applications in medicine.
- 3) Explain the biological hazards of ionizing radiation & protective measures.
- 4) Explain the normal Anatomy, Physiology of various organs and their deviation from normal) & its consequences.
- 5} summarize the fundamental aspects of embryology & alteration in development with reference to congenital anomalies.
- 6) Select appropriate imaging modality for- study of specific condition.
- 7) Explain .the role of imaging, pre-operative, intra-operative & post-operative Conditions.
- 8) Evaluate role of imaging modalities in various therapeutic applications (interventional Radiology)
- 9) Update information about recent advances in imaging sciences.
- 10) Effectively organize & supervise the diagnostic procedures to ensure quality control/assurances.

b) Skills:-

At the end of the course the student shall be able to:

- 1) Make use of conventional & other imaging sciences to achieve definitive diagnosis.
- 2) Analyze & interpret imaging data.
- 3) Demonstrate the skills of solving Scientific & clinical problems & decision making.
- 4) Develop skills as a self directed learner; recognize continuing educational needs, select & use appropriate learning resources.

5) Demonstrate basic concepts of research methodology & be able to critically analyze relevant literature.

c) Integration-

Knowledge acquired in Radio diagnosis shall help the students to integrate imaging techniques with structure & function of the human body in health & disease.

Postgraduate Training:

A. The training is spread over 3 years and includes following components:

1. Theory Lectures for Radiation Physics.
2. Rotational posting in various sub-specialties.
3. Seminars, case discussion, journal club.
4. Research methodology and thesis.

B. Clinical Sciences

Theoretical back ground including recent advances should be the pre-requisite to the clinical training of post graduate students.

C. Training in different organ systems.

Details of facilities to carry out additional classes and Practical at

PG level

* Department also possesses adequate numbers of Assistant Professors, Tutors and technical staff to assist PG teaching.

* Regular schedule of Interactive PG lectures, Seminars and Journal club is proposed and will be followed. A student should participate in at least 120 seminars and 60 journal reading sessions.

* Each resident is directed to do at least one research project (preferably clinical project) besides dissertation work.

* PG students are supposed to maintain log book of each and every aspect of training given in the department of Radio-diagnosis and other departments where they were sent for rotation.

* If necessity arises for particular kind of research work then research facility of other departments will also be made available to them.

During the three-year, the student will work in the following areas:-

1.	Conventional Chest	3 Months
2.	Conventional Musculoskeletal including skull, Spine , PNS	3 Months
3.	G.U.	2 Months
4.	G.I.T.	3 Months
5.	US including Doppler	6 Months
6.	CT (Body + Head – 3 months each)	6 Months
7.	Emergency Radiology	3 Months
8.	M.R.I.	3 Months
9.	Interventional Radiology including angiography	4 Months
10.	Nuclear Medicine	1 Months
11.	Elective posting	2 Months
	Total	36 Months

PROPOSED SCHEDULE FOR ROTATION OF RESIDENTS

Year (1/6)	Chest	Chest	Musculo – Skeletal	G.U	G.U	US
(2/6)	US	CT(H)	CT (B)	G.I.T.	G.I.T.	US
Year (3/6)	Chest + Mammo – graphy	Musculo Skeletal	Musculo Skeletal	G.I.T.	Emg.	CT(H)
(4/6)	CT(B)	US+ Doppler	Intervention	US	Emg.	Nuclear Medicine
Year (5/6)	CT (Head)	MRI	MRI	Intervention	Intervention	CT(B)
Year	MRI	Emg.	Intervention	US	Elective	Elective

Theory Exam:

PAPER –I

Radiation Physics. Protective measures & Physics involving imaging techniques and related basic sciences e.g. Anatomy. Physiology and Pathology.

TOPICS.

- 1) Radiations and production of X-rays
- 2) X-ray generators
- 3] Basic interactions between X-Rays and matter
- 4] Attenuation.
- 5] Filters and grids.
- 6] Luminescent screens.
- 7] Physical and Photographic characteristics of X-ray film & film processing
- 8] Fluoroscopic imaging -viewing and recording.
- 9] Radiographic image and its geometry.
- 10] Body section radiography.
- 11] Steroscopy.
- 12] Xeroradiography.
- 13] Computed tomography.
- 14] Ultrasound.
- 15] Radiation's hazards and protection.
- 16] Digital Radiography.
- 17] Nuclear magnetic resonance.
- 18] Magnetic resonance imaging.
- 19] Wet processing of films -Chemistry of Developer, fixer etc,
- 20] Dry processing – chemistry of films & its processing.

PAPER- II

Radiological Imaging in congenital & systemic diseases- I

- a) Respiratory system: Congenital anomalies, Pediatric chest, Chest wall, pleura, diaphragm, Mediastinum, Pulmonary infections, Airway obstruction, Pulmonary neoplasms, Diffuse pulmonary diseases.
- b) Cardio-vascular system: Congenital heart Disease's, left-to-right shunts Cyanotic heart diseases, Acquired valvular heart diseases, Ischemic heart disease, Pulmonary circulation, cardiomyopathy, cardiac tumors, Pericardium, thoracic aorta.
- c) Gastro Intestinal Tract: Oesophagus, Stomach, Duodenum, Small intestine large bowel, mesentry & omentum, Pediatric abdomen.

d) Hepato-biliary: Liver, Biliary tract, Pancreas.

PAPER-III

Radiological Imaging in congenital & systemic diseases-II

- a) Skeletal system: Skeletal trauma benign lesions, malignant lesions, Myeloproliferative & similar disorders, metabolic and endocrine diseases, skeletal dysplasias and malformation syndromes, joint disease, bone and joint infection, radiology of soft tissues, musculo-skeletal system in children.
- b) Genito-urinary system: Renal parenchymal diseases, Renal masses. Calculus disease and urinary obstruction, urinary bladder and prostate, Reno-vascular disorders, injuries, Renal failure and transplantation, pediatric uro-radiology Imaging in obstetrics and gynecology, imaging of breast.
- c) CNS: Skull, Intra-cranial tumors, Intra-cranial infections, Cerebro-vascular disease, cranial and intracranial malformatins trauma, CSF disturbances, degenerative diseases of spine infections of spine, spinal tumours.

PAPER-IV

Miscellaneous, Radiological procedures, Interventional Radiology, .Recent advances and newer techniques.

- Orbit, ENT, Dental, Reticule-endothelial system, Oncology, HIV infection and AIDS, - Arteriography, venography.....etc.

PRACTICAL EXAMINATION:

- | | | |
|-----|-----------------------------------|---|
| A). | One Long case and Two Short Cases | - |
| B). | Practical and Viva | |
| | I. Spot Film Diagnosis (40-50) | - |
| | II. Radiation Physics | - |
| | III. Techniques | - |
| | IV. Implements / Contrast Media | - |
| | V. Nuclear Medicine | - |
| | VI. Pathology | - |

A. BASIC RADIOLOGY

I. IMAGING TECHNIQUES AND MODALITIES

- 1.1.1 Department Organization: Digital Imaging and PACS:
- 1.1.2 Digital imaging and PACS: Picture Reliving and Communication System
- 1.1.3 Digital Imaging and PACS: what should a radiologist expect from PACS
- 1.1.4 Digital Imaging and PACS: Image processing in Computed Radiography
- 1.2 Intravascular Contrast Media
- 1.3 Whole body Computed Tomography: Recent Advances
- 1.4 Magnetic Resonance Imaging Basic Principles
- 1.5 Ultrasound: general Principles
- 1.6 Radionuclide imaging
 - 1.6.1 Radionuclide imaging: General Principles
 - 1.6.2 Radionuclide imaging: Pediatric Nuclear Medicine
- 1.7 Dual Energy X-ray Absorptiometry
- 1.8 Functional and Physiological Imaging
- 1.9 Medicolegal issues in Diagnostic Radiology
- 1.10 Radiation Protection and patient doses in diagnostic radiology

II. RESPIRATORY SYSTEM:

1.1 Techniques of Investigations

- 1.1.1 Standard Techniques
- 1.1.2 Tomography: a) Conventional film Tomography b) Computed Tomography
- 1.1.3 Digital Radiography
- 1.1.4 Magnetic Resonance Imaging
- 1.1.5 Radionuclide Imaging a) Ventilation b) Other thoracic scanning techniques
- 1.1.6 Bronchography
- 1.1.7 Ultrasound
- 1.1.8 Angiography
- 1.1.9 Lung Biopsy & Other Interventional Techniques.

1.2 Normal Chest:

- 1.2.1 The Lungs (Radiological Anatomy) & CT Terminology)
- 1.2.2 The Central Airways
- 1.2.3 The Lungs beyond Hila
- 1.2.4 The Hila
- 1.2.5 The Mediastinum : a) CT & MRI b) Plain film appearances
 - i) The junctional lines:
 - ii) The right Mediastinum above azygous vein
 - iii) The left Mediastinum above Aortic arch
 - iv) The supra aortic Mediastinum on lateral view
 - v) The right Middle Mediastinum border below azygous arch.
 - vi) The left cardiac border below aortic arch

vii) The para spinal lines

viii) The retrosternal line

1.2.6 The Diaphragm

1.3 Interpretation the Chest Radiograph:

1.3.1 Identification of the Radiograph

1.3.2 Technical Consideration

1.3.3 Detection and Description of abnormalities: i) Silhouette Sign

ii) Alterations

iii) Consolidation

iv) Collapse

v) Nodular Opacities

vi) Ring Opacities

vii) Linear/ Interstitial/ Pleural, /Chest Wall Opacities.

viii) Abnormal Transradiancy

1.4 The Chest Wall, Pleura & Diaphragm

1.4.1 Chest Wall:

i) Soft tissue /Breasts

ii) Ribs /Sternum/Clavicle, Spine

1.4.2 The Pleura:

i) Normal Pleura

ii) Pleural Pathologies

1.4.3 The Diaphragm:

i) Height/ Eventration/Movements/Paralysis

ii) Hernias/Trauma/Neoplasm

1.5 The Mediastinum:

1.5.1 Techniques. .

1.5.2 Mediastinal Masses: i) Thyroid/ Para Thyroid Masses/Thymic tumors/Thymic

hyperplasia/Teratoma/ Germcell Tumor.

ii) Mediastinal lymphadenopathy

iii) Neurogenic Tumors

iv) Extra medullar hematopoiesis/Mesenchymal Tumors/ Herniation of / Mediastinal lipomatosis/ Aneuryum

1.5.3 Differential Diagnosis:

1.5.4 Other Mediastinal Lesions: i) Acute/ fibrosing Mediastinitis

1.6 Pulmonary Infections in Adults.

1.6.1 Pneumonia

1.6.2 Associated features and complications of pneumonia

1.6.3 Pulmonary tuberculosis

1.6.4 HIV & AIDS

1.7 Large Airway Obstruction:

1.7.1 Collapse: General features /Collapse of individual lobes / entire lung/ segmental collapse/

Rounded /obstructive collapse

1.7.2 Obstructive Pneumonitis/ Bronchoscope/Bronchiectasis

1.8 Pulmonary lobar Collapse essential considerations:

1.9 Chronic inflow Obstruction:

- 1.9.1 Asthama:
- 1.9.2 Chronic Bronchitis and Emphysema
- 1.9.3 Bronchiolitis

2.0 Pulmonary Neoplasms :

- 2.0.1 Bronchial Carcinomas
- 2.0.2 Benign Pulmonary Tumors
- 2.0.3 Malignant Lymphoma
- 2.0.4 Metastases
- 2.0.5 The solitary Pulmonary Nodule

21 Diffuse Pulmonary. Disease / Industrial Lung Disease / HRCT:

- 2.1.1 Pulmonary Oedema :
- 2.1.2 Diffuse pulmonary Hemorrhage
- 2.1.3 Inhalation of particulate matter
- 2.1.4 Diffuse pulmonary Fibrosis
- 2.1.5 Sarcoidosis / Collagen Vascular Disease / Systemic Vasculitidis / Lymphoid Disorders of Lungs / Pulmonary Eosinophilia / Drug induced Lung Disease

2.2 Chest Trauma:

2.3 Pulmonary Thromboembolism :

- 2.3.1 Imaging Chest Radiograph/ Radionuclide Study / Pulmonary Arteriography/ CT / MRI

2.4 .Post Operative & Critically ill Patients:

- 2.4.1 Cardiopulmonary Disease
- 2.4.2 Post Thoracotomy Radiograph
- 2.4.3 Support and Monitoring apparatus
- 2.4.4 Radiation Therapy

2.5 Chest Radiography after Lung Transplantation:

26 Congenital Pulmonary Anamolies:

- 2.6.1 Abnormal Development of Lung Bud
- 2.6.2 Abnormalities of separation of the lung had from the foregut
- 2.6.3 Abnormalities of Pulmonary Vasculature
- 2.6.4 Ectopic of Hamartomatous Development

2.7 The Infant and Young Child:

- 2.7.1 Pathologies of Diaphragm
- 2.7.2 Pleural Abnormalities
- 2.7.3 Inflammation
- 2.7.4 Airway Obstruction
- 2.7.5 Diffuse Lung Disease.
- 2.7.6 Respiratory Distress in Newborn Baby

2.8 Interventional Techniques in Thoracs:

- 2.8.1 Biopsy Procedures
- 2.8.2 Thoracic Drainage Procedure
- 2.8.3 Thoracic Sympathectomy
- 2.8.4 Therapeutic Embolisation
- 2.8.5 Dilatation & Stenting Techniques

2.8.6 Extraction Techniques.

III. THE HEART AND GREAT VESSELS

3.1 Cardiac Anatomy and Enlargement- :

3.1.1 Plain Radiography

3.1.2 Enlargement of various chambers on Plain Radiography

3.2 Echo Cardiography including Doppler.

3.3 Nuclear Cardiology:

3.4 Digital Imaging of Cardiovascular System.

3.5 Magnetic Resonance of Heart and Circulation.

3.6 Congenital Heart Disease:

3.6.1 General Principles

3.6.2 Left to right shunts.

3.6.3 Central Sinuses

3.6.4 Other Congenital Heart Disease

3.7 Acquired Heart Disease: i) Non Rheumatic/ Rheumatic Mitral VD

ii) Tricuspid VD

iii) Aortic VD

3.8 Ischaemic Heart Disease : i) Coronary Atreriography

ii) Left Ventriculography

iii) Angina Pectoris

iv) Myocardial Infarction

v) Mechanical Complication of MI

3.9 Pulmonary Circulation: i) Anatomy and Physiology

ii) Pulmonary Vascularity in Heart Disease

iii) Pulmonary Arterial hypertension/ Its Imaging

iv) MR in Pulmonary Vascular Abnormalities.

3.10 Cardiomyopathy, Cardio Tumors, Trauma:

3.11 The Imaging of Prosthetic Cardiac Valves:

3.12 The pericardium:

3.13 Thoracic Aorta:

3.14 Interventional Procedures and Heart Disease:

IV .THE GASTROINTESTINAL TRACT:

4.1 The Abdomen: Plain Radiographic findings in acute abdomen

4.1.1 Normal appearances

4.1.2 Abdominal Calcification/Dilatation of bowel/Pneumoperitoneum

4.1.3 The Post Operative Abdomen

4.1.4 Inflammatory Conditions

4.2 The Esophagus

4.2.1 Anatomy .and Functions

4.2.2 Methods of Examination

4.2.3 Pathologies of Esophagus

4.2.4 Motility Disorders

4.2.5 Extrinsic lesions/ miscellaneous conditions

1.3 The stomach

4.3.1 Radiological anatomy and methods of examination

4.3.2 Inflammatory Diseases

4.3.3 Neoplastic Conditions

4.4.4 Radionuclide Studies in Stomach

4.4 The Duodenum

4.4.1 Anatomy and Normal Appearances

4.4.2 Methods of Radiological Examination

4.4.3 Peptic ulceration

4.4.4 Gastro heterotopia /diverticula

4.4.5 Neoplasms benign and malignant

4.3 The Small Intestine

4.5.1 Anatomy and normal appearances

4.5.2 Methods of radiological examination

4.5.3 Crohns disease/Coeliac Disease/Neoplasms/various conditions

6 The Large Bowel

4.6.1 Anatomy and Normal Appearances

4.6.2 Methods of Radiological Examination

4.6.3 Tumors

4.6.4 Diverticular Disease

4.6.5 Colitis

4.6.6 Aids

4.6.7 Miscellaneous Conditions

4.7 Peritoneum, Mesentery and Omentum

4.7.1 Peritoneal spaces and reflections

4.7.2 Abnormalities of Peritoneum

4.7.3 Abnormalities of Mesentery

4.7.4 Abnormalities of greater Omentum

4.8 Gastrointestinal Angiography.

4.8.1 General Consideration

4.8.2 Gastro intestinal bleeding

4.9 Interventional Radiology in Gastrointestinal tract

4.9.1 Introduction

4.9.2 Esophagus

4.9.3 Stomach and Duodenum

4.9.4 Small Intestine

4.9.5 Colon and Rectum

4.10 Pediatric Gastrointestinal Radiology

4.10.1 The Neonate

4.10.2 The Infant and Older Child

V. Liver, Biliary tract, Pancreas, Endocrine System and Lymphoma

5.1 The Liver

5.1.1 Normal and variant Anatomy

5.1.2 Liver Imaging Techniques

5.1.3 Diffuse Disease

5.1.4 Focal Disease

5.1.5 Intervention

5.2 The Biliary Tract

5.2.1 Anatomic Consideration

5.2.2 Methods of investigation

5.2.3 Biliary Disorders

5.3 Interventional Techniques Hepatobiliary System

5.3.1 Liver Biopsy

5.3.2 Biliary Obstruction

5.3.3 Malignant Biliary Obstruction

5.3.4 Percutaneous Cholangiography and Biliary Drainage Procedures

5.3.5 Vascular Interventional Techniques in Hepatobiliary System

5.4 Radiology of Liver Transplantation

5.4.1 Indications

5.4.2 Pre Transplant Assessment

5.4.3 Radiological Procedures before Transplantation

5.4.4 Post Transplantation Monitoring and Complications

5.5 The Pancreas

5.5.1 Embryology and Anatomy

5.5.2 Congenital Anomalies

5.5.3 Multisystem Diseases with Pancreatic involvement

5.5.4 Pancreatitis

5.5.5 Pancreatic Neoplasms

5.5.6 Trauma

5.5.7 Interventional Radiology in Pancreas

5.6 Imaging of the Endocrine System:

5.6.1 Hypothalamic-Pituitary Axis

5.6.2 Pineal Gland

5.6.3 Thyroid Gland

5.6.4 Parathyroid Gland

5.6.5 Pancreatic & Gastrointestinal Endocrine Disorders

5.6.6 Carcinoid Tumors

5.6.7 Adrenal Glands

5.6.8 Female Reproductive System .

5.6.9 Male Reproductive System

5.7 Reticuloendothelial Disorders: Lymphoma

5.7.1 Epidemiology

5.7.2 Histopathological Classification

5.7.3 Staging Investigation and Management

5.7.4 Extranodal Manifestation of Lymphoma

5.7.5 Monitoring response to therapy

5.8 Reticuloendothelial Disorders: The Spleen

5.8.1 Imaging Techniques

5.8.2 Normal Anatomy

5.8.3 Splenomegaly

- 5.8.4 Benign Mass Lesions
- 5.8.5 Malignant Mass Lesions
- 5.8.6 Splenic Trauma
- 5.9 Paediatrics Liver Biliary Tract and Spleen:**
 - 5.9.1 Techniques
 - 5.9.2 Approach
 - 5.9.3 Liver
 - 5.9.4 Biliary Disease
 - 5.9.5 Spleen
- 5.10 Paediatrics Endocrine and Bone Density Imaging :**
 - 5.10.1 Ultrasound
 - 5.10.2 Nuclear Medicine
 - 5.10.3. Magnetic resonance Imaging
 - 5.10.4 Bone Densitometry in Children
- 5.11 Neuroblastoma:**

VI Genito Urinary Tract:

- 6.1 Methods of Investigation:**
- 6.2 Radionuclide Imaging in Genito Urinary Tract:**
- 6.3 Urodynamics**
- 6.4 Reno Vascular Disease:**
 - 6.4.1 Renal Arteriography
 - 6.4.2 Vascular Abnormalities
 - 6.4.3 Radiological Management of Reno Vascular Disease
- 6.5 Renal Parenchymal Disease**
 - 6.5.1 Normal Appearance
 - 6.5.2 Renal Parenchymal Disease
 - 6.5.3 Parasitic Infections
- 6.6 Renal Masses:**
 - 6.6.1 Methods of Analysis
 - 6.6.2 Pathological Renal Masses
 - 6.6.3 Neoplastic Renal Masses
- 6.7 Calculus Disease & Urothelial Lesions**
 - 6.7.1 Calculus Disease
 - 6.7.2 Nephrocalcinosis
 - 6.7.3 Urothelial Tumors
- 6.8 Urinary Obstruction:**
 - 6.8.1 Pathophysiology
 - 6.8.2 Causes of Obstruction
- 6.9 Radiological Evaluation of Urinary Bladder, Prostate & Urethra:**
- 6.10 Injuries to the Genito-Urinary Tract:**
- 6.11 Renal Failure and Transplantation:**
- 6.12 Interventional Uroradiology:**
- 6.13 Imaging of the Kidneys & Urinary Tract in Children**
 - 6.13.1 Embryology
 - 6.13.2 Techniques.

6.13.3 Interventional Procedure"

6.14 Imaging of Paediatric Pelvis:

6.14.1 Imaging Techniques;

6.14.2 Normal Anatomy

6.14.3 Congenital Anomalies

6.14.4 Pelvis Masses

6.14.5 Scrotal Disease

VII Skeletal System:

7.1 Skeletal Trauma

7.2 Bone Tumors: Generals Characteristic & Benign Lesions

7.3 Bone Tumors: Malignant Lesions

7.4 Myeloproliferative and Similar Disorders

7.4.1 Generalised/Localised Decreased in Bone Density

7.4.2 Generalised/Localised Increased in Bone Density

7.4.3 Delayed Skeletal Maturity

7.5 Metabolic and Endocrine Disease of the Skeletal

7.6 Skeletal Dysplasias and Malformation Syndrome

7.7 Joints Diseases:

7.7.1 Rheumatoid Arthritis

7.7.2 Other Connective Tissue Disease

7.7.3 Crystal Deposition Arthropathy

7.7.4 Degenerative Joint Disorders/Degenerative spine

7.7.5 Arthrography/ HPOA/ Pachy Dermoperiostritis

7.8 Bone and Soft tissue Infection:

7.9 Imaging of Soft tissue:

7.10 Bone Tumors in Children:

7.10.1 Imaging approach

7.10.2 Benign Bone Tumors

7.10.3 Malignant Bone Tumors

7.11 The Radiology of Non Accidental Injury in Children:

7.12 Paediatric Musculo -Skeletal Trauma

7.13 Radiology of Arthritides in Children

7.14 Radiology of Soft tissue in Children

7.15 Bone and Soft tissue infection in Children.

VIII. The Reproductive System:

8.1 Ultrasound in Obstetrics and Gynaecology

8.1.1 Indication

8.1.2 Instrumentation in US Techniques

8.1.3 Gynecological infertility

8.1.4 Assessing Tubal Patency

8.2 Imaging in Gynaecology

8.3 Hysterosalpingography

8.4 The Breast & its Imaging

8.5 Breast Cancer

8.6 Male Reproductive System

IX Central Nerve System:

9.1 Skull and Brain: Methods of Examination and Anatomy

9.2 Cranial and Intracranial Pathology: Tumors in Adults

9.3 Cranial and Intracranial Pathology: Cerebro Vascular Disease and Non Traumatic

Intracranial Haemorrhage

9.4 Cranial and Intracranial Pathology: Infections, AIDS, Demyelinating and Metabolic

Disease

9.5 Cranial and intracranial Pathology: Trauma, Bone Pathology, CSF: Disturbances,

Epilepsy

9.6 Spine: Method of Investigation

9.7 Imaging of Spinal Pathology

9.8 Scoliosis in Children

9.9 Neonatal Head and Spine Sonography

9.10 Neurology in Children

X. The Orbit; ENT; Face; Teeth:

10.1. The Orbit

10.1.1 Anatomy / Techniques

10.1.2 Intraocular Abnormalities

10.1.3 Lacrimal Gland Tumors

10.1.4 Muscular Tumors

10.1.5 Intra/Extra Canal Tumors

10.2 Ear, Nose and Throat Radiology

10.2.1 The Ear

10.2.2 Nose and Paranasal Sinuses

10.2.3 Pharynx

10.3. Maxillofacial Radiology

10.3.1 Fractures of Maxilla

10.3.2 TM Joint

10.3.3 Salivary Glands

10.4. Dental Radiology

10.5. Pediatrics, Eye & Orbit:

10.5.1 Imaging Techniques

10.5.2 Child with Proptosis or an Orbital mass

10.5.3 Child with Orbital Infection

10.5.4 .Child with White Eye

10.5.5 Child with Development Abnormalities

10.6. Paediatric ENT Imaging

B. RADIOLOGICAL PHYSICS & X-RAY TECHNOLOGY:

1. Radiation:

2. Production of X -Rays:
3. X- Ray Generators:
4. Basic Interaction between X- Rays and Matter:
5. Attenuation:
6. Filters:
7. X- Ray beam restrictors:
8. Physical characteristics of x- Ray films & film Processing:
9. Photographic characteristics of X- Ray films:
10. Fluroscopic imaging and image intensifier
11. Viewing & recording of the Fluroscopic Image:
12. The Radiographic Image:
13. Geometry of the Radiographic Image:
14. Body section Radiography:
15. Stereoscopy:
16. Xero-Radiography:
17. Computed Tomography:
18. Ultrasound
19. Digital Radiography:
20. Nuclear Magnetic Resonance:
21. Magnetic Resonance Imaging:
22. Radiation hazards & Protection:
- 23 Electric & Protection:
24. Cine Angiography:
25. Atomic structure, Radioactive Isotopes & Gamma Camera:
26. Positron Emission Tomography:
27. Digital Subtraction Angiography:
28. Catheters, guides wires, dilators, balloons & stents:
29. Pictorial Achieving & Communicating System (PACS):
30. DICOM:

C. DARK ROOM TECHNIQUES

1. Layout of Ideal Dark Room: maintenance and its accessories:
2. Developer: ingredients & their action:
3. Developer: exhaustion & methods of determination:
4. Replenisher & rapid development:
5. Fixer: ingredients & their action:
6. Fixer: exhaustion & methods of determination:
7. Effect of temp on standard development/fixing time & methods to maintain it.
8. Tropical processing
9. Intensifying screens /construction, types and advantages:
10. Rare earth intensifying screens:
11. Intensification factor:
12. Cassette: .construction & care
13. Factors affecting image details:
14. Factors affecting image contrast & density:
15. Grids: construction & types

16. Cones & collimeter:
17. X-Ray films -construction, types & storage:
18. Film faults in dark room & their prevention:
19. Film fog:
20. Hangers:
21. Safe light:
22. Automatic developing unit:
23. Day light loading and unloading of films.