SYLLABUS

NEURO & VASCULAR INTERVENTIONAL RADIOLOGY

DURATION OF THE COURSE : TWO YEARS

A: General Principles:

Each Fellowship student is required to possess a comprehensive knowledge of the imaging modalities used in interventional radiology and develop the skills to do both diagnostic and therapeutic interventional procedures. He/she should have personally performed a sufficient number of interventional procedures and be able to diagnose and treat common adult and paediatric pathologies that are amenable to intervention. He/she should also possess sufficient knowledge and experience in research methodology and development and is expected to complete a research project during the tenure of his fellowship.

CLINICAL SKILLS FOR FELLOWSHIP (Interventional and vascular imaging fellowship)

1. Good familiarity and adequate skills in performing / interpreting vascular imaging modalities (Doppler, CT angiograms, MR angiograms, MRI)
2. Work up of cases and decide on feasibility for intervention
3. Active involvement in the inter-departmental discussions
4. On call interventional duty
5. Independent skills in diagnostic interventional procedures
6. Partial independent skills in therapeutic interventional procedures

Infrastructure:

Machines:

- Biplane DSA, preferably biplane equipment
- MRI Scanners

- CT scanners 64 slice or more
- USG scanners with Doppler
- Xray units with fluoroscopy

Duration and Rotation: (recommended)

DSA	16 months
(Mandatory 12 months)	
Critical Care (Neuro+ Surgical + Medical ICU)	2 months
CT, CTA and CT guided procedures	2 months
MRI and MRA	2 months
Ultrasound guided procedures and Doppler	2 months

Posting in another centre of excellence for the duration of One Month or More is recommended.

Total: two years

Supervision:

Initially, the fellow will be fully supervised by the Faculty posted in the area. In the course of training, the level of supervision will be tapered according to the experience and confidence gained.

On-Call:

We believe that attending to emergency and unscheduled cases outside duty hours is an essential part of training. The Fellow will be " Intervention on call " during the DSA posting.

Overview of training

Clinical knowledge will be acquired by a variety of means, including close liaison with appropriate medical and surgical and radiological meetings. Multidisciplinary meetings should be emphasised.

The following inter-relationships are important:

• Vascular surgery

- Urology
- Neurological sciences
- Gastroenterology
- General surgery
- Oncology and Haematology

1. The trainee should be encouraged and given the opportunity to attend and lead appropriate clinico-radiological and multidisciplinary meetings.
2. The trainee should be encouraged to attend appropriate educational meetings and courses.
3. The trainee should participate in and initiate relevant clinical audit.
4. Trainees will be expected to be familiar with current interventional radiology literature.
5. The trainee should be encouraged to participate in research, and to pursue one or more projects up to and including publication. An understanding of the principles and techniques used in research, including the value of clinical trials and basic biostatistics, should be acquired. Presentation of research and audit results at state and national meetings would be encouraged.
6. The trainee should be knowledgeable in basics of angiographic equipment and radiation safety along with ICRP and AERB regulations
7. The trainee should continue to participate in the on-call rota, with appropriate consultant back up.
8. Acquisition of specific skills to enable:

- The conduct, supervision and accurate interpretation of all imaging techniques used to a high professional standard
- The safe and effective practice of interventional techniques in the appropriate body system(s)
- Good communication with patients and professional colleagues

- Accurate informed consent to be obtained
- Appropriate decisions about terminating the procedure for technical reasons or grounds of safety / comfort to the patient.

9. A clear understanding of the role of multidisciplinary meetings, including:

- Planning of investigations including the selection of appropriate tests and imaging techniques for a clinical problem
- Planning and outcomes of treatment
- Promoting an understanding of relevant pathology

10. Procedural competence will need to be reviewed at intervals, and this regular review should also assess the number of cases required in order to ensure competence.

11. Radiologists who devote essentially all their time to interventional radiology will be expected to undertake a wide range of complex procedures. Acquisition of the necessary expertise requires such trainees to undertake a proportionately larger number of interventional procedures.

12. All interventional radiologists must have a thorough knowledge of the techniques required to perform sedation and analgesia procedures, as well as patient monitoring throughout and following the procedures, and should be familiar with existing guidelines.

13. The trainee should be aware of local and national guidelines on consent, and be capable of obtaining informed patient consent for practical procedures.

Subspecialty training in vascular interventional radiology

Diagnostic arteriography (50–150)

Percutaneous angioplasty (65–130)

Percutaneous central venous access (10–20)

Thrombolysis

Embolisation

Vascular stent insertion

Foreign body retrieval

Aspiration thrombectomy

Peripheral aneurysm exclusion

Transjugular intrahepatic portosystemic shunt

Chemoembolisation

Aortic stent grafting (thoraco-abdominal)

Cerebral AVM – embolisation

Intracranial aneurysmal coiling

Uroradiological intervention

Renal tract access, eg nephrostomy (20–40)

Ureteric dilatation/stent insertion (5–10)

Renal biopsy/cyst aspiration (5–10)

Drainage of collections

Varicocele embolisation

Fallopian tube recanalisation

Transrectal prostate biopsy (20–40)

Gastointestinal interventions

GI dilatations and stents (10–20)

Percutaneous gastrostomy (5–10)

Transjugular/plugged liver biopsy (5–10)

Radiofrequency ablation

Percutaneous biliary drainage procedures and/or stent insertion

Trainees should acquire experience in the practical procedures listed above, and the number of cases undertaken should be recorded in their log book.

Regardless of the technique, the consultant trainer must be satisfied that the trainee is clinically competent, as determined by an in-training performance assessment, and can consistently interpret the results of investigations accurately and reliably and can safely perform interventional techniques.

The academic activities of the program in the hospital would include:-

1. Regular academic sessions
2. Case discussion and seminars
3. Paper presentation
4. Audit, Project, Research
5. Conferences / CMEs / Live workshops
6. Conferences / CMEs / Live workshops

EXIT EXAMINATION:

At the end of two years. Mainly practical oriented, - including multiple worked up cases and viva.

ADMINISTRATION:-

Research and audit :-

The fellow will have to:

- Undertake a project and have submitted at least one publication within the year
- Present at one regional and one national conference.
- Participate in the daily teaching sessions within the department, and make regular presentations.
- Take part in Inter-departmental meetings relevant to the area posted.

Basic and advanced modules for training of beginner and experienced radiology trainees:

The groupings that follow are based on the concept of modular training, and the numbers for the more routine procedures (in parentheses) range from what might be expected as a guide for someone with more than one subspecialty interest up to that which might be expected for a dedicated interventional radiologist.

To sum up:

The goal of the intervention radiology training is to familiarise the trainee with

A) Performing diagnostic procedures (USG and CT guided)

B) Performing interventional procedures (Neurovascular, Vascular and non-vascular)

C) Interpreting relating studies such as CT Angiography, MR Angiography

D) Performing and interpreting Doppler.

E) The Fellow is expected to complete a project and recommended at least one publication per year.

Recommended reading

Author Name	Name of the Books	Publishing Company
Alrbert L. Abrams	Abrams Angiography, Vascular and Interventional Radiology V- I	Medical Education and Research Inc.
Alrbert L. Abrams	Abrams Angiography, Vascular and Interventional Radiology V- II	Medical Education and Research Inc.
Alrbert L. Abrams	Abrams Angiography, Vascular and Interventional Radiology V- III	Medical Education and Research Inc.
Paul Ross	An Atlas of Normal Vertebral Angiograms.	Butter worth Group
Paul Ross	An Atlas of Normal Vertebral Angiograms.	Butter worth Group
Kazuhiko	Cerebral Angio – CT	Raven Press
G. Ansel	Complications in Diagnostic Imaging	Black well scientific Pub
G. Ansell	Complications in diagnostic radiology.	Blackwell scientific
Joseph K. Lee	Computed Body Tomography. Vol - I	Raven Press Books Ltd.
Joseph K. Lee	Computed Body Tomography. Vol – II	Raven Press Books Ltd.
Charles F. Lanzleri	Computed Tomography and Magnetic Resonance Imaging of the whole body Vol - I	Mosby – Year book Inc.
Charles F. Lanzleri	Computed Tomography and Magnetic Resonance Imaging of the whole body Vol – II	Mosby – Year book Inc.
T. A. Lie	Congenital Anomalies of the Carotid Arteries	Williams & Wilkins
Malcolm	Core Text of Neuro Anatomy	Williams and Wilkins

Carpenter		
Sandler	Correlative Imaging. Nuclear medicine Magnetic Resonance, Computed Tomography, Ultrasound	Williams & Wilkins
Traveras	Diagnostic Neuroradiology Vol – I	Williams & Wilkins
Traveras	Diagnostic Neuroradiology Vol – II	Williams & Wilkins
Grainger	Diagnostic Radiology 3rd edition Vol – I	Churchill Livingstone
Grainger	Diagnostic Radiology 3rd edition Vol – II	Churchill Livingstone
Grainger	Diagnostic Radiology 3rd edition Vol – III	Churchill Livingstone
M. Pinson	Emergency Interventional Radiology	Little Brown
JJ Connors	Interventional Neuroradiology Practical Techniques.	W.B. Sounders Company
Albert Mass	Interventional Radiologic Techniques. Computed Tomography and Ultrasonography.	Academic Press Inc.
Joseph I Ferrucci	Interventional Radiology of the Abdomen	Williams & Wilkins
Ernest J. Ring	Interventional radiology principles and Techniques	Little Brown
Wilfrido R Castaneda	Interventional Radiology Vol – I	Williams & Wilkins
Wilfrido R Castaneda	Interventional Radiology Vol – II	Williams & Wilkins
Zwiebel	Introduction to Vascular Ultrasonography. 3rd edition.	
Scott Atlas	Magnetic Resonance Imaging of the Brain and Spine. Vol - I	
Scott Atlas	Magnetic Resonance Imaging of the Brain and Spine. Vol – II	