P.G. Curriculum
M.S. Orthopaedics
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M.S. Orthopaedics

The infrastructure and faculty will be as per MCI Guidelines

1. Goals

The goal of MS course in Orthopaedics is to produce a competent orthopaedic surgeon who is:

- Aware of the current concepts in quality care in Orthopaedics and musculoskeletal trauma and also of diagnosis, therapeutic, medical and surgical management of orthopaedic problems
- Able to offer initial primary management of acute orthopaedic and trauma emergencies
- Aware of the limitations and refer readily to major centres for more qualified care of cases which warrant such referral
- Aware of research methodology and be able to conduct research and publish the work done
- Able to effectively communicate with patients, their family members, people and professional colleagues
- Able to exercise empathy and a caring attitude and maintain high ethical standards
- Able to continue taking keen interest in continuing education irrespective of whether he / she is in teaching institution or in clinical practice
- Dynamic, available at all times and proactive in the management of trauma victims and orthopaedic emergencies

2. Objectives

At the end of MS course, the resident should be adept in the following domains:

- Skill to take a proper history for musculoskeletal disorders
- Clinical examination of all musculoskeletal disorders
- Application of history & clinical findings in making an appropriate clinical diagnosis
- Interpretation of investigations
- Discussion of options of treatment and follow up rehabilitation for the diagnosis made
- Have an in-depth theoretical knowledge of the syllabus with emphasis on current concepts
- Learn basic skills in musculoskeletal surgery including training on bone models and on patients by assisting or performing under supervision or perform independently as required.
- Have basic knowledge of common disorders of the spine, PIVD, degenerative disorders of spine, trauma spine and infections of spine for diagnosis and evaluation of the common spine disorders
- Develop a familiarity to major topics under “Sports Medicine” - to gain exposure to the basic surgery, master the pathophysiology of the conditions

usually encountered and develop a sound foundation to add new knowledge in the future

- Learn basic principles of Hand Surgery with emphasis on applied anatomy, understanding pathophysiology of common conditions, planning of treatment and post operative protocols
- Develop understanding of principles of soft tissue coverage and learn basic techniques used in extremity surgery

3. Syllabus

3.1 Theory

- **General Orthopaedics**
  - **Infections**
    - General Principles of Infection
    - Osteomyelitis
    - Infectious Arthritis
    - Tuberculosis and Other Infections
  - **Tumors**
    - General Principles of Tumors
    - Benign Tumors of Bone
    - Malignant Tumors of Bone
    - Soft Tissue Tumors and Nonneoplastic Conditions Simulating Bone Tumors
  - **Congenital Anomalies**
    - Congenital Anomalies of Lower Extremity
    - Congenital and Developmental Anomalies Of Hip and Pelvis
    - Congenital Anomalies of Trunk and Upper Extremity
  - **Peripheral Nerve Injuries**
    Diagnosis and management
  - **Microsurgery**
    Basic principles and techniques
  - **Imaging in Orthopaedics**
  - **Other Nontraumatic Disorders**
    - Osteochondrosis
    - Rickets and osteomalacia
    - Metabolic bone disease
    - Cerebral Palsy
    - Paralytic Disorders
    - Neuromuscular Disorders
    - Genetic disorders
    - Osteonecrosis

- **Traumatology**
  - **Fractures and Dislocations**
    - General Principles of Fracture Treatment
    - Fractures of Lower Extremity
    - Fractures of Hip
    - Fractures of Acetabulum And Pelvis
    - Fractures of Shoulder, Arm, and Forearm
    - Malunited Fractures
    - Delayed Union and Nonunion Of Fractures

- ★ Acute Dislocations
- ★ Old Unreduced Dislocations
- ★ Fractures, Dislocations and Ligamentous Injuries of the hand
- ★ Fractures and Dislocations of Foot
- ★ Fractures and Dislocations In Children

❖ **Regional Orthopaedics**

➢ **Spine**

- ★ Spinal Anatomy And Surgical Approaches
- ★ Fractures, Dislocations, And Fracture-Dislocations Of Spine
- ★ Arthrodesis Of Spine
- ★ Pediatric Cervical Spine
- ★ Scoliosis And Kyphosis
- ★ Lower Back Pain And Disorders Of Intervertebral Discs
- ★ Infections Of Spine

➢ **Sports Medicine**

- ★ Ankle Injuries
- ★ Knee Injuries
- ★ Shoulder And Elbow Injuries
- ★ Recurrent Dislocations

➢ **The Hand**

- ★ Basic Surgical Technique and Aftercare
- ★ Acute Hand Injuries
- ★ Flexor and Extensor Tendon Injuries
- ★ Wrist Disorders
- ★ Paralytic Hand
- ★ Cerebral Palsy of the Hand
- ★ Arthritic Hand
- ★ Compartment Syndromes and Volkmann Contracture
- ★ Dupuytren Contracture
- ★ Carpal Tunnel, Ulnar Tunnel, and Stenosing Tenosynovitis
- ★ Tumors and Tumorous Conditions of Hand
- ★ Hand Infections
- ★ Congenital Anomalies of Hand

➢ **The Foot and Ankle**

- ★ Surgical Techniques
- ★ Disorders of Hallux
- ★ Pes Planus
- ★ Lesser Toe Abnormalities
- ★ Rheumatoid Foot
- ★ Diabetic Foot
- ★ Neurogenic Disorders
- ★ Disorders of Nails and Skin
- ★ Disorders of Tendons and Fascia

❖ **Operative Orthopaedics**

➢ **Surgical Techniques and Approaches**

- ★ Arthrodesis
  - o Arthrodesis of Ankle, Knee and Hip
  - o Arthrodesis of Shoulder, Elbow and Wrist

- ★ Arthroplasty
  - Arthroplasty of Ankle and Knee
  - Arthroplasty of Hip
  - Arthroplasty of Shoulder and Elbow
- ★ Amputations
  - General Principles of Amputations
  - Amputations about Foot
  - Amputations of Lower Extremity
  - Amputations of Hip And Pelvis
  - Amputations of Upper Extremity
  - Amputations of Hand
- ★ Arthroscopy
  - General Principles Of Arthroscopy
  - Arthroscopy Of Lower Extremity
  - Arthroscopy Of Upper Extremity

3.2 Practical

- ❖ Closed Reduction of Fractures, Dislocations
- ❖ Mastering Plastering Techniques
- ❖ Debridement of Open Fractures
- ❖ External Fixator application
- ❖ Internal Fixation of minor fractures with K-wires
- ❖ Closed manipulative correction of congenital problems like CTEV & other skeletal deformities.
- ❖ Biopsies – FNAB, FNAC, Trocar needle, open
- ❖ Excision of benign lesions
- ❖ Tendon lengthening
- ❖ Incision and drainage, acute Osteomyelitis / Septic Arthritis
- ❖ Skull tongs application
- ❖ Tension band wiring
- ❖ Interfragmentary compression
- ❖ Plate Osteosynthesis of Forearm bones
- ❖ Carpal Tunnel Release
- ❖ Bone grafting
- ❖ Soft tissue releases
- ❖ Interlocking IM Nailing of Tibia & Femur
- ❖ Humerus Plating
- ❖ Ankle Fracture Fixations
- ❖ DHS Fixation
- ❖ Hemiarthroplasty Hip
- ❖ Caudal epidural injections
- ❖ Facet Block
- ❖ Vertebroplasty
- ❖ Exposure of posterior spine
- ❖ Laminectomy
- ❖ Anterior and posterior instrumentation of spine
- ❖ Bone Skills Lab
  - ➢ Tension Band Wiring
  - ➢ Lag Screw Interfragmentary Compression
  - ➢ Broad Plating

- Narrow Plating
- External Fixation
- Cancellous Screw Fixation
- Dynamic Hip Screw Fixation
- Dynamic Condylar Screw Fixation
- Tibia Intramedullary Interlocking Nailing
- Femur Intramedullary Interlocking Nailing
- Tibial Condyle Fixation
- Elbow fractures Fixation
- Ankle Fractures Fixation
- Pelvis – External Fixation
- Pubic Symphysis – ORIF
- Acetabulum Fracture Fixation
- MIPPO Tibia
- Hemiarthroplasty
- Spine - Posterior Instrumentation
- Spine – Anterior Instrumentation

- To clinically diagnose, assess, investigate and initially manage all surgical and medical emergencies
- To learn to assess ABC and perform CPR
- To perform
  - Endotracheal intubation
  - Peripheral and Central intravenous cannulation
  - Intercostal drainage tube insertion
  - Peritoneal aspiration
- Splintage of the spine and limbs for fracture-dislocations
- To learn the use of certain emergency drugs – adrenaline, atropine, dopamine, Steroids, analgesics etc.
- To learn to apply
  - Glassgow Coma Scale (GCS)
  - AO classification of fractures
  - Gustillo Anderson grading of open fractures
  - Mangled Extremity Severity Scoring
- To learn to communicate with patient's attendants on death of patient
- To learn to handle confidentiality issues

4. Teaching Program

4.1. General Principles

Acquisition of practical competencies being the keystone of postgraduate medical education, postgraduate training is skills oriented.

Learning in postgraduate program is essentially self-directed and primarily emanating from clinical and academic work. The formal sessions are merely meant to supplement this core effort.

4.2. Teaching Sessions

- Bedside teaching rounds
- Journal club
- Seminar
- PG case discussion

- X – Ray discussion
- Ortho-radio meet
- Ortho-Pathology Meet
- Central session (held in hospital auditorium regarding various topics like CPC, guest lectures, student seminars, grand round, sessions on basic sciences, biostatistics, research methodology, teaching methodology, health economics, medical ethics and legal issues).

4.3 Teaching Schedule

In addition to bedside teaching rounds, in the department there will be daily hourly sessions of formal teaching per week. The suggested time distribution of each session for department's teaching schedule as follows:

1. Journal club	Once a week
2. Seminar	Twice a week
3. PG case discussion	Twice a week
4. Ortho-radio meet	Once a month
5. Ortho-Pathology Meet	Once a month
6. Central session	As per hospital schedule

Note:

- All sessions are supervised by faculty members. It is mandatory for all residents to attend the sessions except those posted in emergency.
- All the teaching sessions are assessed by the faculty members at the end of session and marks are given out of 10 and kept in the office for internal assessment.
- Attendance of the residents at various sessions has to be at least 75%.

5. Posting

The postgraduate student rotates through the clinical units in the department

6. Thesis

6.1 Every candidate shall carry out work on an assigned research project under the guidance of a recognized Post Graduate Teacher; the project shall be written and submitted in the form of a thesis.

6.2 Every candidate shall submit thesis plan to the University within the timeframe set by the University.

6.3 Thesis shall be submitted to the University six months before the commencement of theory examination i.e. for examination May/June session, 30th November of the preceding year of examination and for November/ December session 31st May of the year of examination.

6.4 The student will (i) identify a relevant research question; (ii) conduct a critical review of literature; (iii) formulate a hypothesis; (iv) determine the most suitable study design; (v) state the objectives of the study; (vi) prepare a study protocol; (vii) undertake a study according to the protocol; (viii) analyze and interpret research data, and draw conclusions; (ix) write a research paper.

7. Assessment

All the PG residents are assessed daily for their academic activities and also periodically.

7.1. General Principles

- The assessment is valid, objective, and reliable.
- It covers cognitive, psychomotor and affective domains.
- Formative, continuing and summative (final) assessment is also conducted in theory as well as practicals/clinicals. In addition, thesis is also assessed separately.

7.2 Formative Assessment

The formative assessment is continuous as well as end-of-term. The former is to be based on the feedback from the senior residents and the consultants concerned. End-of-term assessment is held at the end of each semester. Formative assessment will not count towards pass/fail at the end of the program, but will provide feedback to the candidate.

7.3 Internal Assessment

The performance of the Postgraduate student during the training period should be monitored throughout the course and duly recorded in the log books as evidence of the ability and daily work of the student. Marks should be allotted out of 100 as followed.

Sr. No.	Items	Marks
1.	Personal Attributes	20
2.	Clinical Work	20
3.	Academic activities	20
4.	End of term theory examination	20
5.	End of term practical examination	20

1. Personal attributes:

Behavior and Emotional Stability: Dependable, disciplined, dedicated, stable in emergency situations, shows positive approach.

Motivation and Initiative: Takes on responsibility, innovative, enterprising, does not shirk duties or leave any work pending.

Honesty and Integrity: Truthful, admits mistakes, does not cook up information, has ethical conduct, exhibits good moral values, loyal to the institution.

- **Interpersonal Skills and Leadership Quality:** Has compassionate attitude towards patients and attendants, gets on well with colleagues and paramedical staff, is respectful to seniors, has good communication skills.

2. Clinical Work:

- **Availability:** Punctual, available continuously on duty, responds promptly on calls and takes proper permission for leave.
- **Diligence:** Dedicated, hardworking, does not shirk duties, leaves no work pending, does not sit idle, competent in clinical case work up and management.

- **Academic ability:** Intelligent, shows sound knowledge and skills, participates adequately in academic activities, and performs well in oral presentation and departmental tests.
- **Clinical Performance:** Proficient in clinical presentations and case discussion during rounds and OPD work up. Preparing Documents of the case history/examination and progress notes in the file (daily notes, round discussion, investigations and management) Skill of performing bed side procedures and handling emergencies.

3. **Academic Activity:** Performance during presentation at Journal club/ Seminar/ Case discussion/Stat meeting and other academic sessions. Proficiency in skills as mentioned in job responsibilities.

4. **End of term theory examination** conducted at end of 1st, 2nd year and after 2 years 9 months

5. **End of term practical/oral examinations** after 2 years 9 months.

Marks for **personal attributes** and **clinical work** should be given annually by all the consultants under whom the resident was posted during the year. Average of the three years should be put as the final marks out of 20.

Marks for **academic activity** should be given by the all consultants who have attended the session presented by the resident.

The Internal assessment should be presented to the Board of examiners for due consideration at the time of Final Examinations.

7.4 Summative Assessment

- Ratio of marks in theory and practicals will be equal.
- The pass percentage will be 50%.
- Candidate will have to pass theory and practical examinations separately.

A. Theory examination (Total = 400 marks)

	Title	Marks
Paper 1:	Basic Sciences and related Orthopaedics	100
Paper 2:	Principles & Practice of Orthopaedic diseases & Operative Orthopaedics	100
Paper 3:	Traumatology and its related aspects	100
Paper 4:	Recent Advances in Orthopaedics	100

B. Practical & Viva voce examination (Total = 400 marks)

Cases-		300 marks	
Long case	One-		150 marks
Short cases	Three- 50×3 =		150 marks
Oral/ Viva-		100 marks	
Pathology specimens & X-Rays			25 marks
Bones			25 marks
Implants & Instruments			25 marks
Orthosis & Prosthesis			25 marks

8. Job responsibilities

- Evaluation of patients in emergency, completing the file work and their management including resuscitation, wound cleaning and splintage
- History taking and examination of patient admitted to ward, their diagnostic workup, follow up of investigations, making a diagnosis and a treatment plan
- Preparation of OT List
- Pre-operative planning
- Preparation of patients for surgery and post operative care
- Assisting in operation theater
- Daily rounds for evaluation of patients, ordering relevant investigations and following them up, dressing of patients and completing daily progress notes
- Preparation of discharge slip and advising the patient accordingly

Work-up of patients in Out-patient department

9. Suggested Books

9.1. Core books

- Apley's System of Orthopaedics & Fractures
- Campbell's Operative Orthopaedics
- Mercer's Orthopaedic Surgery
- Mc Rae – Clinical Examination
- Hamilton Bailey Demonstration of Clinical Signs & Symptoms
- Snell's Anatomy
- Pye's Surgical Handicraft
- Stewart's Manual

9.2. Reference books

- Rockwood & Green – Fractures in Adults
- Rockwood & Green – Fractures in Children
- Chapman Orthopaedic Surgery
- Turek's Textbook of Orthopaedics
- Hoppenfield – Surgical Exposures
- Mc Rae – Surgical Exposures

- Insall & Scott – Surgery of the Knee
- Miller & Cole Textbook of Arthroscopy
- Tachdjian Paediatric Orthopaedics

9.3. Journals

- Journal Bone & Joint Surgery – American
- Journal Bone & Joint Surgery – British
- Orthopaedic Clinics of North America
- Clinical Orthopaedics & Related Research
- Indian Journal of Orthopaedics
- Spine
- Hand Clinics
- Rheumatology Clinics
- Injury
- Journal of Orthopaedic Trauma
- Arthroscopy

10. Model Test Papers

MODEL QUESTION PAPER

MS (Orthopaedics)
Paper-I
Basic Sciences and Related Orthopaedics

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I Describe extensor expansion of finger. Discuss its applied aspects with regards to tendon injuries.

II How will you investigate and manage Vitamin D Resistant Rickets?

III What is the role of DMARDs in Rheumatoid arthritis?

IV Describe in brief the phases of normal human gait cycle.

V What is the contribution of Sir Hugh Owen Thomas to Orthopaedics?

VI Draw and label blood supply of head of femur. Mention the applied aspects with regards to Perthes' disease.

VII Mention the zones of epiphysis of growing bone. Discuss the relevant pathophysiology with respect to Rickets and Scurvy.

VIII What is Mangled Extremity Severity Score? Discuss its role in a crushed limb.

IX Enumerate the clinical tests for assessment of ACL deficit knee. Elaborate on pivot-shift test.

X What are the parameters tested in synovial fluid analysis? How are they altered in various pathologies?

MODEL QUESTION PAPER

MS (Orthopaedics)
Paper-II
Principles & Practice of Orthopaedic Diseases & Operative Orthopaedics

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I Enumerate various surgical techniques for treatment of anterior recurrent dislocation shoulder. Elaborate on Bankart's repair.

II Draw an illustration depicting normal trabecular pattern of femoral head and neck. Describe Singh's Index in detail.

III Describe the clinical picture, pathology and management of Pigmented Villonodular synovitis.

IV What is Intrinsic minus and plus deformity of the hand. List the various causes of both.

V Outline the stages of Perthes' disease. Describe classification systems?

VI Describe in detail Dilwyn – Ewan procedure.

VII Write a short note on Klippel - Fiel syndrome.

VIII Discuss the stages of myositis ossificans around elbow. List the causes, its prevention and management.

IX Write a short note on posterolateral intervertebral fusion.

X How do you classify Spondylolisthesis? Discuss its pathoanatomy.

MODEL QUESTION PAPER

MS (Orthopaedics)
Paper-III
Traumatology and Related Aspects

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I Outline the approach to a polytrauma patient in emergency.

II Discuss mechanical and pharmacological prevention of DVT.

III Discuss Neer's classification of fracture proximal humerus. Elaborate on management of four-part fractures.

IV Discuss Tardy ulnar nerve neuritis with respect to its causes and surgical management.

V What is malunited fracture distal radius? Describe its surgical management in adults.

VI Illustrate the zones of flexor tendons in hand. Discuss tendon surgery in 'No-man's zone'.

VII What are the principles of rehabilitation of paraplegic patient?

VIII Compare SCFE and traumatic transepiphyseal separation of paediatric hip. Discuss surgical management of SCFE.

IX Enumerate posterior approaches to acetabulum. Describe Kocher-Langenback approach.

X Discuss the management of smashed elbow.

MODEL QUESTION PAPER

MS (Orthopaedics)
Paper-IV
Recent advances in Orthopaedics

Max. Marks:100 *Time: 3 hrs*

- ***Attempt ALL questions***
- ***Answer each question & its parts in SEQUENTIAL ORDER***
- ***ALL questions carry equal marks***
- ***Illustrate your answer with SUITABLE DIAGRAMS***

I What are various types of BMPs? Mention the current uses of BMPs.

II Elaborate on the principles of locked compression plating. What are its applications in peri-articular fractures?

III Discuss the evolution of hip resurfacing arthroplasty. What are the complications of this technique?

IV How is Multidrug resistant TB diagnosed? Outline steps of its management.

V Describe in detail the concept of Damage control Orthopaedics.

VI Give an account of Tumour markers in bone tumours.

VII Enumerate the various modalities available to treat cartilage defects in young patients. Elaborate on Mosaic Arthroplasty.

VIII Describe the working of a bone-bank.

IX Describe the functional anatomy of ACL. Elaborate on Double bundle ACL reconstruction.

X Discuss Minimally invasive arthroplasty of hip with regards to its advantages & disadvantages.