# Orthopaedic Trauma Surgery Fellowship Training

# Objectives and Syllabus

# Ganga Medical Centre and Hospitals, Coimbatore

## PROGRAMME GOAL

The goal of the Orthopaedic Trauma Surgery Fellowship is to provide fellows with intensive training and broad exposure in the diagnosis and treatment of a wide spectrum of musculoskeletal injuries resulting from trauma, and in conducting relevant research. The fellow will learn to evaluate and manage routine and complex traumatic conditions affecting the extremities, pelvis, and acetabulum, utilizing both operative and non-operative methods.

This fellowship offers comprehensive exposure to acute fracture care, post-traumatic reconstruction, management of polytrauma patients, and the treatment of fracture related complications. This program is designed for the orthopaedic surgeon who is dedicated to developing a strong foundation in the management of all aspects of orthopaedic trauma, employing the most advanced surgical techniques and principles.

Upon completion of the Orthopaedic Trauma Surgery Fellowship, fellows will be well-prepared to establish successful surgical practices, contribute meaningfully to research, and potentially pursue academic careers at leading medical centers and hospitals nationally and internationally.

The overarching goal of this fellowship is to develop a highly competent orthopaedic trauma surgeon capable of independently recognizing and managing a broad variety of musculoskeletal injuries resulting from trauma.

1. Develop a comprehensive orthopaedic trauma surgeon capable of critical thinking and managing a wide spectrum of traumatic musculoskeletal conditions like

* Acute fractures of the upper and lower extremities
* Pelvic and acetabular fractures
* Polytrauma management and coordination of care
* Fractures in the elderly and osteoporotic patients
* Periarticular fractures and complex articular injuries
* Fracture complications (nonunion, malunion, infection)

* Soft tissue injuries associated with fractures

2. Acquire a detailed working understanding of musculoskeletal anatomy as it pertains to fracture patterns, surgical approaches, and the principles of fracture fixation.

3. Become proficient and comfortable with a wide array of operative techniques for fracture fixation, including the use of various implants (plates, screws, nails, external fixators) and specialized trauma instruments.

4. Gain exposure to and develop skills in a broad range of surgical approaches to the appendicular and pelvic skeleton for fracture reduction and fixation.

5. Learn to thoroughly assess the trauma patient, including comprehensive history taking, focused physical examination, interpretation of radiographic and advanced imaging, and understanding the principles of non-operative and operative treatment strategies.

**PROGRAM OBJECTIVES**

Objectives of the Programme:

* To acquire the skills necessary to assess and manage patients who present with acute musculoskeletal injuries resulting from trauma.

* To be able to efficiently categorize patients based on the initial history, physical examination, and mechanism of injury. This includes identifying patients with isolated injuries versus complex polytrauma.

* To understand and be able to implement the appropriate diagnostic studies, including plain radiographs, CT scans, MRI scans, and other relevant investigations, to arrive at an accurate diagnosis and treatment plan.

* To develop the patient management skills essential for effectively interacting with patients in the acute trauma setting, including communication with patients and their families regarding diagnosis, treatment options, and prognosis.

* To recognize when non-operative management is the most appropriate treatment strategy and to be able to implement these methods effectively.

* To develop the skills necessary to plan and perform a wide range of surgical procedures for fracture fixation and soft tissue management, utilizing various approaches and techniques.

* To develop the surgical expertise needed to utilize a variety of implants and fixation devices appropriately and effectively.

* To develop skills as an investigator by participating in and potentially designing, implementing, completing, and interpreting retrospective or prospective clinical studies related to orthopaedic trauma.

* To thoroughly understand the principles of professional liability relevant to the management of orthopaedic trauma patients.

* To thoroughly understand the importance of accurate and comprehensive record documentation and risk management in the trauma setting.

* To consistently exhibit professionalism in all interactions with patients, families, colleagues, and allied healthcare professionals.

**Eligibility Criteria:**

The fellowship is open to orthopaedic surgeons with the following eligibility criteria:

* A postgraduate degree in Orthopaedic Surgery (e.g., MS Orthopaedics, DNB Orthopaedics) from a recognized University.

* Candidates who have completed two years of practice following postgraduate training are preferred (not compulsory).

* Surgeons with documented interest in orthopaedic trauma surgery through prior training, relevant courses, and/or publications are preferred.

The fundamental components of the teaching programme should include:

* Case presentations & discussion: Once a week, focusing on challenging and complex trauma cases.

* Seminar: Once a week, covering specific topics in orthopaedic trauma, including surgical techniques, complications, and management principles.

* Journal club: Once a week, critical appraisal of recent and relevant literature in orthopaedic trauma.

* Grand round presentation (by rotation departments and subspecialties): Once a week, providing exposure to the broader context of trauma care.

* Faculty lecture teaching: Once a month, in-depth discussion of key concepts and advancements in orthopaedic trauma.

* Clinical Audit: Once a Month, review of patient outcomes and identification of areas for improvement in clinical practice.

* Presentation at a recognized conference: Completion of at least one poster presentation and one oral presentation during the fellowship training period.

Clinical activities will include bedside sessions, file rounds, detailed documentation of patient history, physical examination, progress notes, round discussions, review of investigations, and formulation of management plans. Emphasis will be placed on the discussion of interesting and complex cases.

The training program will emphasize the acquisition of knowledge, development of surgical skills, and the cultivation of appropriate professional attitudes and behaviors essential for the delivery of high-quality orthopaedic trauma care. This will encompass theoretical learning, clinical experience, practical surgical training, and exposure to research methodology and teaching principles.

Theoretical: Theoretical knowledge will be imparted through interactive discussions, journal clubs, symposia, and seminars. Fellows will be exposed to the latest advancements in orthopaedic trauma through critical review of current literature. This is considered crucial to supplement the often-limited exposure to trauma during undergraduate and postgraduate surgical training.

Symposia: Fellows will be required to present a minimum of 10 topics based on the fellowship curriculum to faculty and peers. These presentations will encourage open discussion and critical analysis. Presentation topics and dates will be provided to the fellows in advance.

Clinical: Fellows will be closely mentored by faculty members to develop proficiency in history taking, focused physical examination in the trauma setting, appropriate ordering and interpretation of investigations, and the formulation and execution of comprehensive management plans.

Bedside: Fellows will actively participate in the evaluation and management of trauma patients under the guidance of attending surgeons, gaining hands-on experience in clinical decision-making.

Journal Clubs: This will be a weekly academic exercise. A list of relevant orthopaedic trauma journals will be provided. Fellows will be responsible for summarizing and critically appraising

selected scientific articles. A faculty member will guide the discussion, encouraging participation from other faculty and residents. The significance of the article's contribution to the field and any limitations will be highlighted.

Research: Fellows will be required to undertake a research project and prepare a thesis/dissertation in accordance with institutional guidelines. They will also have the opportunity to participate in ongoing research projects within the department to gain experience in research design, methodology, and execution.

**SYLLABUS**

Basic & Applied Sciences:

* Musculoskeletal Anatomy: Detailed review of the anatomy of the upper and lower extremities, pelvis, and acetabulum, with emphasis on structures relevant to fracture patterns and surgical approaches.

* Biomechanics of Fracture Fixation: Principles of load sharing, stress shielding, and the mechanical properties of different fixation devices.

* Fracture Healing: Biological processes involved in bone healing and factors that influence it.

* Physical Examination in Trauma: Systematic approach to the examination of the injured patient, including neurovascular assessment and evaluation of associated soft tissue injuries.

* Radiologic Imaging in Trauma: Interpretation of plain radiographs, CT scans, MRI scans, and other imaging modalities relevant to orthopaedic trauma.

* Principles of Non-operative Fracture Management: Indications, techniques, and potential complications of closed reduction and immobilization.

* General Principles of Operative Fracture Management: Timing of surgery, surgical approaches, reduction techniques, and implant selection.

* Surgical Approaches to the Extremities, Pelvis, and Acetabulum: Detailed knowledge of standard surgical exposures and relevant anatomical landmarks.

* Principles of Internal Fixation: Application of plates, screws, intramedullary nails, and other internal fixation devices.

* Principles of External Fixation: Indications, techniques, and management of complications associated with external fixation.

* Bone Grafting and Bone Substitutes in Trauma: Biology and clinical applications of autograft, allograft, and synthetic bone substitutes.

* Management of Soft Tissue Injuries Associated with Fractures: Principles of wound care, management of open fractures, and the role of plastic surgery.

* Pain Management in Trauma: Acute and chronic pain management strategies in the orthopaedic trauma patient.

* Infection in Orthopaedic Trauma: Prevention, diagnosis, and management of post-traumatic infections.

* Compartment Syndrome: Pathophysiology, diagnosis, and treatment.

* Fat Embolism Syndrome: Recognition and management.

* Thromboembolic Disease in Trauma: Prevention and treatment strategies.

* Polytrauma Management: Principles of resuscitation, prioritization of injuries, and coordination of care with other specialties.

* Fractures in the Elderly and Osteoporotic Patients: Specific considerations for fracture management in this population.

<u>Specific Fracture Management:</u>

* Upper Extremity Trauma: Fractures of the clavicle, scapula, humerus (proximal, shaft, distal), elbow (distal humerus, olecranon, radial head), forearm (radius and ulna shafts, distal radius).

* Lower Extremity Trauma: Fractures of the femur (proximal, shaft, distal), patella, tibia (proximal, shaft, distal), fibula, ankle (malleolar fractures, syndesmotic injuries).

* Pelvic Ring Injuries: Classification, diagnosis, and surgical and non-surgical management of various pelvic fracture patterns.

* Acetabular Fractures: Classification, surgical approaches, reduction techniques, and fixation strategies for acetabular fractures.

* Periarticular Fractures: Complex fractures involving joints, including principles of articular reduction and fixation.

* Fracture Complications: Management of nonunions, malunions, infections, and post-traumatic deformities.

Miscellaneous:

* Principles of Damage Control Orthopaedics: Indications and techniques for staged surgical management in severely injured patients.

* Minimally Invasive Fracture Fixation Techniques: Principles and applications of less invasive surgical approaches and implants.

* Application of allograft in Fracture Healing

* Rehabilitation of the Trauma Patient: Principles of early mobilization and comprehensive rehabilitation programs.

* Legal and Ethical Considerations in Trauma Care.

**Academic Career Training:**

In addition to clinical care and research, fellows will develop essential teaching and organizational skills necessary for an academic career. Fellows will work closely with residents and other trainees in coordinating patient care. They will participate in teaching sessions, potentially conduct skills labs, and contribute to the preparation of educational materials.

Learning:

The fellow will actively participate in:

* Presenting pre- and post-operative cases for discussion and critical analysis.

* Extensive reading of textbooks and relevant journal articles.

* Active participation in the operating room as an assistant and primary surgeon under supervision.

* Participating in outpatient clinics, gaining experience in initial evaluations and follow-up care.

* Engaging in pre-operative planning and discussions for surgical cases.

* Contributing to ongoing research projects within the department.

* Preparing and potentially publishing case reports, technical notes, or original research articles.

* Assisting in the training and education of junior residents and medical students.

* Participating in relevant conferences, CME activities, and seminars.

Research:

Fellows are required to complete at least one publishable research project during their fellowship. They will work closely with faculty mentors and research support staff. They will be encouraged to participate in both clinical and basic science research projects relevant to orthopaedic trauma. Fellows will be expected to submit and present their research findings at national and international meetings.

# Orthopaedic Arthroplasty Fellowship Training

# Objectives and Syllabus

# Ganga Medical Centre and Hospitals, Coimbatore

## PROGRAMME OVERVIEW

**Ganga Medical Centre and Hospitals, Coimbatore** stands as a premier high-volume arthroplasty centre performing approximately **3,500 joint replacements annually**, including **500 complex revision surgeries**. As a recognized **Centre of Excellence**, our institution is committed to delivering optimal functional outcomes through the adoption of cutting-edge instrumentation and implant technology.

Our distinguished arthroplasty division routinely manages complex surgical cases and major revisions with consistently excellent clinical outcomes. The program provides fellows with unparalleled exposure to high-volume practice, advanced surgical techniques, and complex case management in a state-of-the-art facility.

### Programme Goal

The Arthroplasty Fellowship aims to develop highly competent arthroplasty surgeons through intensive training in the diagnosis, treatment, and research of hip and knee arthritis from various aetiologies including degenerative conditions, trauma, and infection. Fellows will master both operative and non-operative management of routine and complex joint replacements, preparing them for successful independent practice and potential academic careers.

This fellowship offers comprehensive exposure to primary hip and knee replacement, Complex Primary knee and hip replacement, revision surgeries and the treatment of arthroplasty related complications. This program is designed for the orthopedic surgeon who is dedicated to

developing a strong foundation in the management of all aspects of Arthroplasty, employing the most advanced surgical techniques and principles.
Upon completion of the Arthroplasty Fellowship, fellows will be well-prepared to establish successful surgical practices, contribute meaningfully to research, and potentially pursue academic careers at leading medical centers and hospitals nationally and internationally.

# LEARNING OUTCOMES AND COMPETENCIES

## Primary Learning Outcomes

Upon completion of this fellowship, graduates will be able to:

1. **Clinical Assessment & Diagnosis**
    - Demonstrate comprehensive patient evaluation skills including history-taking, physical examination, and imaging interpretation
    - Accurately diagnose and classify various arthritic conditions affecting hip and knee joints
    - Formulate appropriate treatment plans for complex arthroplasty cases

2. **Surgical Proficiency**
    - Perform primary and revision hip and knee arthroplasty procedures independently
    - Utilize advanced surgical techniques including computer navigation and robotic-assisted surgery
    - Manage intraoperative complications effectively

3. **Clinical Decision Making**
    - Distinguish between operative and non-operative candidates
    - Select appropriate implants and surgical approaches for specific clinical scenarios
    - Implement evidence-based treatment protocols

4. **Research & Academic Skills**
    - Design, conduct, and publish clinical research in arthroplasty
    - Critically appraise scientific literature

- Contribute to medical education and training programs

5. **Professional Development**
    - Demonstrate ethical practice and professionalism
    - Communicate effectively with patients, families, and healthcare teams
    - Understand medicolegal aspects of arthroplasty practice

# ELIGIBILITY CRITERIA

The fellowship is open to orthopaedic surgeons with the following eligibility criteria:

* A postgraduate degree in Orthopaedic Surgery (e.g., MS Orthopaedics, DNB Orthopaedics) from a recognized University.

* Candidates who have completed two years of practice following postgraduate training are preferred (not compulsory).

* Surgeons with documented interest in orthopaedic trauma surgery through prior training, relevant courses, and/or publications are preferred.

# CURRICULUM STRUCTURE

### Academic Activities

| Activity | Frequency | Objectives |
|---|---|---|
| **Case Presentations** | Weekly | Discuss complex cases, decision-making, outcomes |
| **Arthroplasty Seminar** | Weekly | Cover specific surgical techniques and complications |
| **Journal Club** | Weekly | Critical literature appraisal and evidence-based practice |
| **Grand Rounds** | Weekly | Interdisciplinary case discussions |
| **Faculty Lectures** | Monthly | Advanced concepts and recent developments |
| **Clinical Audit** | Monthly | Outcome analysis and quality improvement |

| Activity | Frequency | Objectives |
|---|---|---|
| **Research Meetings** | Monthly | Project updates and methodology discussions |

The training program will emphasize the acquisition of knowledge, development of surgical skills, and the cultivation of appropriate professional attitudes and behaviors essential for the delivery of high-quality Arthroplasty care. This will encompass theoretical learning, clinical experience, practical surgical training, and exposure to research methodology and teaching principles.

**Theory:** Theoretical knowledge will be imparted through interactive discussions, journal clubs, symposia, and seminars. Fellows will be exposed to the latest advancements in Arthroplasty through critical review of current literature. This is considered crucial to supplement the often-limited exposure to trauma during undergraduate and postgraduate surgical training.

**Symposia:** Fellows will be required to present a minimum of 10 topics based on the fellowship curriculum to faculty and peers. These presentations will encourage open discussion and critical analysis. Presentation topics and dates will be provided to the fellows in advance.

**Clinical:** Fellows will be closely mentored by faculty members to develop proficiency in history taking, focused physical examination in the trauma setting, appropriate ordering and interpretation of investigations, and the formulation and execution of comprehensive management plans.

**Bedside:** Fellows will actively participate in the evaluation and management of arthroplasty patients under the guidance of attending surgeons, gaining hands-on experience in clinical decision-making.

**Journal Clubs:** This will be a weekly academic exercise. A list of relevant Arthroplasty journals will be provided. Fellows will be responsible for summarizing and critically appraising selected scientific articles. A faculty member will guide the discussion, encouraging participation

from other faculty and residents. The significance of the articles contribution to the field and any limitations will be highlighted.

**Research:** Fellows will be required to undertake a research project and prepare a thesis/dissertation in accordance with institutional guidelines. They will also have the opportunity to participate in ongoing research projects within the department to gain experience in research design, methodology, and execution.

# DETAILED SYLLABUS

## FUNDAMENTAL SCIENCES

### A1. Musculoskeletal Anatomy

- Detailed anatomy of hip, knee, pelvis, and acetabulum
- Surgical anatomy and anatomical landmarks
- Neurovascular structures and their clinical significance
- Applied anatomy for various surgical approaches

### A2. Biomechanics of Hip and Knee

- Joint kinematics and kinetics
- Load transmission and stress distribution
- Biomechanical principles of implant design
- Gait analysis and functional assessment

### A3. Materials Science and Tribology

- Implant materials: metals, ceramics, polymers
- Bearing surface options and wear characteristics
- Corrosion and biocompatibility
- Recent advances in implant technology

### A4. Imaging and Diagnostics

- Plain radiographic interpretation and templating
- Advanced imaging: CT, MRI, nuclear medicine

- Computer-assisted preoperative planning
- Intraoperative imaging techniques

## SECTION B: CLINICAL EVALUATION AND MANAGEMENT

### B1. Patient Assessment

- Comprehensive history taking techniques
- Systematic physical examination protocols
- Functional assessment scales and outcome measures
- Risk stratification and optimization

### B2. Non-operative Management

- Conservative treatment modalities
- Injectable therapies and viscosupplementation
- Physiotherapy protocols and rehabilitation
- Patient education and lifestyle modification

### B3. Perioperative Care

- Enhanced Recovery After Surgery (ERAS) protocols
- Multimodal pain management strategies
- Thromboembolism prophylaxis
- Infection prevention measures

## SECTION C: PRIMARY HIP ARTHROPLASTY

### C1. Standard Primary Total Hip Arthroplasty

- Surgical approaches: posterior, lateral, anterior
- Component selection and positioning
- Cemented vs. uncemented fixation
- Bearing surface options and selection criteria

### C2. Complex Primary Hip Cases

- Dysplastic hip joints and developmental abnormalities

- Ankylosing spondylitis and inflammatory arthropathy
- Avascular necrosis management
- Post-traumatic arthritis reconstruction

**C3. Hip Arthroplasty for Fractures**

- Acute femoral neck fractures
- Intertrochanteric fracture management
- Acetabular fracture reconstruction
- Distal loading stems and special implants

**C4. Special Situations**

- Protrusio acetabuli reconstruction
- Previous hardware and conversion cases
- Pediatric and young adult considerations

## SECTION D: PRIMARY KNEE ARTHROPLASTY

**D1. Standard Primary Total Knee Arthroplasty**

- Surgical techniques and instrumentation
- Alignment principles and balancing
- Component selection and positioning
- Patellar management strategies

**D2. Unicompartmental Knee Arthroplasty**

- Patient selection criteria
- Mobile vs. fixed bearing designs
- Surgical technique and pearls
- Conversion to total knee arthroplasty

**D3. Complex Primary Knee Cases**

- Severe deformity management (varus/valgus/flexion)
- Post-traumatic and post-osteotomy cases

- Inflammatory arthritis challenges
- Stiff and ankylosed knee management

## SECTION E: REVISION ARTHROPLASTY

### E1. Revision Hip Arthroplasty

- Modes of failure diagnosis
- Preoperative planning and templating
- Surgical exposure techniques
- Component extraction methods
- Bone defect classification and management
- Structural grafts and augments
- Custom implants and megaprostheses

### E2. Revision Knee Arthroplasty

- Failure mechanism evaluation
- Exposure and component removal
- Bone defect management with sleeves and cones
- Constraint options and selection
- Gap balancing and joint line restoration
- Rotating hinge applications

## SECTION F: COMPLICATIONS AND MANAGEMENT

### F1. Periprosthetic Joint Infection

- Diagnosis and staging protocols
- DAIR procedures and indications
- Single-stage vs. two-stage revision
- Antibiotic management and resistance

### F2. Mechanical Complications

- Periprosthetic fracture management
- Instability and dislocation treatment

- Component loosening and wear

**F3. Medical Complications**

- Thromboembolism management
- Heterotopic ossification
- Nerve injury recognition and treatment
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## SECTION G: ADVANCED TECHNIQUES AND TECHNOLOGY

**G1. Computer-Assisted Surgery**

- Navigation system principles and applications
- Robotic-assisted arthroplasty
- Patient-specific instrumentation

**G2. Advanced Reconstruction Techniques**

- 3D printing in arthroplasty
- Biological reconstruction methods

## SECTION H: RESEARCH AND ACADEMIC TRAINING

**H1. Research Methodology**

- Study design and statistics
- Data collection and analysis
- Grant writing and funding
- Publication and presentation skills

# ASSESSMENT

- Detailed surgical logbook with minimum case requirements
- Research thesis with publishable quality
- Quality improvement project documentation
- Case-based discussions

# RECOMMENDED BOOKS & REFERENCES

## *Core Textbooks*

1. **Callaghan JJ, Rosenberg AG, Rubash HE** - *The Adult Hip*
2. **Insall JN, Scott WN** - *Surgery of the Knee*
3. **Barrack RL, Booth RE, Lonner JH** - *Orthopaedic Knowledge Update: Hip and Knee Reconstruction*
4. **Parvizi J, Gehrke T** - *International Consensus on Periprosthetic Joint Infection*
5. **Lieberman JR, Berry DJ** - *Advanced Reconstruction Hip*
6. **Ranawat CS, Allman JK, Bansal M** - *Mastering Orthopaedic Techniques: Total Knee Arthroplasty*
7. **Berry DJ, Lieberman JR** - *Surgery of the Hip*
8. **Sculco TP, Baldini A, Keating EM** - *Total Knee Arthroplasty: A Comprehensive Guide*
9. **Parvizi J, Rothman RH** - *Revision Total Knee Arthroplasty*
10. **Callaghan JJ, Rosenberg AG, Rubash HE** - *The Adult Knee*

11. **Dorr LD** - *Total Hip Arthroplasty: The Cemented Technique*
12. **Ranawat AS, Ranawat CS** - *The Ranawat Award Papers: Three Decades of Innovation in Total Hip Arthroplasty*
13. **Fehring TK, Odum S, Griffin WL** - *Early Failures in Total Knee Arthroplasty*
14. **Brooker AF, Robinson RA** - *Ectopic Ossification Following Total Hip Replacement*
15. **Whiteside LA** - *Surgical Technique and Instrumentation in Total Knee Arthroplasty*

16. **Stiehl JB, Konermann WH, Haaker RG** - *Navigation and Robotics in Total Joint and Spine Surgery*
17. **Jenny JY, Boeri C, Picard F** - *Computer Assisted Orthopaedic Surgery for Total Knee Replacement*
18. **Bathis H, Perlick L, Tingart M** - *Alignment in Total Knee Arthroplasty*

## *Essential Journals*

- **Journal of Bone and Joint Surgery (American and British)**

- **Clinical Orthopaedics and Related Research**
- **The Bone & Joint Journal**
- **Journal of Arthroplasty**
- **The Knee**
- **Hip International**
- **Bone & Joint Research**
- **International Orthopaedics**

### *Online Resources*

- **AAOS Annual Meeting Virtual Library**
- **AAHKS Educational Resources**
- **ISAKOS E-Learning Platform**
- **AO Foundation Online Courses**
- **Orthopaedics One**