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REGULATIONS AND CURRICULUM GOVERNING

FELLOWSHIP IN SPINE SURGERY PROGRAM

(2021-22)

Name of the Constituent Unit/Centre: Yenepoya medical College

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Deralakatte, Mangalore, Karnataka.

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NOTIFICATION

YENEPOYA
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NOTIFICATION – 44-ACM/3/2021 dtd.26.10.2021

Sub: Starting of Spine Fellowship programme

Ref: Resolution of the 44th Academic Council at its meeting held on 05.10.2021 vide agenda - 9

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The Academic Council at its 44th meeting held on 05.10.2021 and the Board of Management at its 55th meeting held on 05.10.2021 have approved the proposal for starting of two year Spine Fellowship Programme under the Faculty of Medicine from the academic year 2021-22.

REGISTRAR
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To:

The Principal, Yenepoya Medical College

Copy to:

1. Controller of Examinations
2. Professor & Head, department of Orthopaedics
3. Dr. Janardhana Aithala, Professor of Orthopaedics
4. Dr. Pavaman Sindgikar, Associate Professor, Neurosurgery
5. File copy

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FELLOWSHIP IN SPINE SURGERY

Preamble

Over the last decade, tremendous advances have taken place in the field of spine surgery, including understanding of spinal ailments and development of newer technologies. As a result, care of spinal ailments has improved, spinal infections and deformities which were once thought to be major problem with significant disability are now being managed with good results improving quality of life. However, these techniques have not reached all corners of country and there are many centres in India, which lack a well trained spine surgeon. Department of Orthopedics and Neurosurgery, Yenepoya Medical College, Mangalore deals with plenty of spinal pathologies and also has qualified manpower and infrastructure to deal with these pathologies. Hence it was planned to start a fellowship so that we can train many young surgeons to meet the demands of the society.

Aim

The course aims at imparting complete training to the candidate in the field of spinal surgery, enabling them to acquire basic skills in spinal surgery.

Goal:

To provide high level in house clinical training in the field of spine surgery for orthopedic and neurosurgeons, so that the trained candidates practice spine surgery independently and able to deal with all types of spinal ailments. He also develops skills for continuous improvement through self directed learning throughout his carrier.

Curriculum overview:

Theoretical knowledge: Syllabus is enclosed below Skills: Clinical skills and surgical skills (described below)

Research experience: Described below

Attitude: To be shown by candidates throughout the program and assessed by Feedback from mentors.

The training involves one to one training.

Theoretical knowledge: Syllabus

Surgical Approaches to Spine

- Cervical
- Thoracic
- Lumbar

Basic osteology of spine

- C1-C2
- Typical sub axial C-spine
- Thoracic spine
- Lumbar
- Sacrum and sacroiliac joint

Basic sciences – Anatomy of spinal column, Neural anatomy, Disc anatomy, biomechanics including spinal stability.

Spinal Instrumentation - Basics (Screw designs, hook designs etc.), Metallurgy basics (properties of SS, Titanium, CC, PEEK) Biomechanics and Applications.

Functional/scoring systems in spine - over view of importance of various scoring systems in different pathologies, validity and reliability, ODI, VAS, SF-36,SRS QUESTTIONAIRE, JOA, MJOA, Nuricks, ASEA grading, tomita, tokuhashi, wang bohlmans, odoms, satisfactions indices.

The Pharmacologic Management of Spine Pain Therapeutic Exercise for Low Back Pain Psychosocial Considerations in Spine Disorders

The Interdisciplinary Treatment of Patients with Chronic Pain

Bone Graft Substitutes - Concept of bone healing, pseudo arthrosis, Bone graft substitutes, BMP, Bone matrices, complications, advantages, recent literature

Spinal fusion – PLF, PLIF, TLIF, XLIF, 360 fusion- Indications, techniques, pitfalls and recent literature

Thoracolumbar Trauma - Basic review of classification systems, importance in management, pitfalls, reliability.

Cervical Trauma - Basic review of classification systems, importance in management, pitfalls, reliability.

Lower Lumbar Fractures – Current evidence.

Spondylolisthesis - classification systems, importance in management, pitfalls, overview of low grade versus high grade listhesis management, what's new in literature.

Scoliosis –Adolescent idiopathic classification and management

Scoliosis – Congenital / Early onset

Scoliosis - Neuromuscular

Adult deformity – Assessment, Indications and management. TB spine past present and future. Medical and conservative. Osteoporotic Fractures overview with indications for cementing Work life balance Spinal Dysraphism

CV junction anomalies and AC Malformations Syringomyelia.

Spinal cord tumours

Overview of literature on various tumours, primary, secondary, management tips from literature, management guidelines on metastasis, GCT SPINE, CHORDOMA SPINE, other primary tumours of spine including recent advances.

Spinal Cord Injury and Rehabilitation strategies/goals

Cervical myelopathy Options, pros, cons, recent trends

Research Methodology. Ethical issues in spine care.

Clinical competencies

This includes

Clinical skills:

Clinical competencies: Appropriate clinical competencies under each of these disorders. (for details please refer program outcomes)

Spine degenerative disorders (Clinical competencies) Trauma

Pediatric and adult deformity

Spinal infections

Spinal inflammatory disorders

Spinal fragility fractures

Spinal tumours

Congenital disorders of spine

Afflictions of spinal cord and spinal canal

Sub-competencies can be developed for each of above domains and are included in Program outcomes.

Surgical skills:

Observation	Assist	Perform independently
Scoliosis correction and instrumentation Thoracoscopic and other anterior assess surgeries	Anterior cervical discectomy and fusion Cervical anterior and posterior instrumentation Long segment cervical, thoracic and lumbar instrumentation Kyphosis correction and stabilization Combined anterior and posterior reconstruction of spinal tumours, spine infections Adult degenerative scoliosis	Microscopic Discectomy Insertion of thoracic and lumbar pedicle screw insertion and stabilization Decompression Anterior interbody preparation and bone grafting/instrumentation Reduction of thoracolumbar fractures and instrumentation. Vertebroplasty/ percutaneous biopsy

Research skills:

1. At the minimum candidates should submit 2 papers to a pubmed /scopus indexed journal and receive reviews.
2. At least two presentations/posters in international/national/state conferences
3. To complete two clinical audits (one per year)

Program Outcomes

No.	Program objective	Program specific Objective.
Trauma		
PO 1	To make a diagnosis	Examine the patient for a possible spinal cord injury including detailed neurological examination. Maintain spinal immobilization until spinal trauma is excluded Arrange appropriate imaging and identify

		the radiographic features of instability and cord injury
PO 2	To formulate a treatment plan	Classify the spinal injury using standard classification system, and make appropriate treatment plan based on evidence based medicine. Plan a rehabilitation program in patients with neurological deficits using a multidisciplinary approach involving critical care providers (airway management), urologists (for management of bladder problems) Nursing care providers (for bed sores) and physiotherapists.
PO 3	To counsel the patient	Describe the risks and benefits of surgical versus conservative
PO 4	Perform appropriate Procedures	To Perform surgical stabilization of spinal injury patients with or without decompression.
PO 5	Manage or prevent Complications	To identify complications at the earliest and initiate appropriate treatment as well as patient counselling. To use appropriate safety checklists for the prevention of complications.

Degenerative disc disorders		
PO 6	To make a diagnosis	Elicit detailed history, assessment of disability, and quality of life Examine the patient, including neurological assessment, to exclude myelopathy/ radiculopathy Select the appropriate diagnostic tests and interpret imaging results.
PO 7	Formulate a treatment plan	Plan a treatment including non-operative and operative treatment using evidence based approach and keeping the patient demands into consideration. Plan appropriate rehabilitation program involving

		physiotherapists.
PO 8	To counsel the patient	Consider the patient's preferences and expectations Recognize the indications for and limitations of surgical intervention. Explain to patient about merits and demerits of both operative and non-operative treatment.
PO 9	Perform procedures	Reduction/stabilization/decompression/fusion depending upon appropriate indications
PO 10	Manage or prevent Complications	Identify complications and manage them. Use of appropriate checklists for the prevention of complications.
Adult and pediatric deformity		
PO 11	To make a diagnosis	Analyze the patient history, comorbidities, disability, and quality of life Examine the patient for spinal imbalance and neurological deficit, other complications including respiratory status. Order appropriate imaging Measure and interpret spinal alignment and spinopelvic parameters Describe the classifications of Scoliosis, Kyphosis, Spondylolisthesis and adult deformities
PO 12	Formulate a treatment plan	Form a treatment plan which includes long term goals using evidence based approach. Assess the need for medical optimization of the patient before surgery, including osteoporosis treatment, Plan for augmentation of instrumentation and dealing with the proximal junction. Discriminate between deformity with and without stenosis and the different management required in adult deformities.
PO 13	Explain treatment options to patients	Discuss with patients the risks and benefits of surgery compared with conservative treatment Consider the patient's preferences and expectations Explain to patients about long term outcomes of both non operative and operative treatment.

		Explain the natural history of progression in pediatric deformities.
PO 14	Perform appropriate procedures	Address spinal balance and consider osteotomies, stabilization, augmentation, distal fixation, proximal junction, posterior and/or anterior fusion as a member of team. Perform surgical procedures for deformities like spondylolisthesis, smaller deformities.
PO 15	Manage or prevent Complications	Be prepared for the challenges of revision surgery Able to identify the complications and manage them including neurological complications. Use of appropriate checklists.
PO 16	To make a diagnosis	Elicit history and examine the patient including neurological assessment and identify the red flag signs. Clinically assess and stage patients with spinal neoplasm using appropriate scoring systems. Classify spinal column neoplasms Describe the pathology of tumors of the spinal column and spinal cord
PO 17	Formulate a treatment plan	Plan treatment using evidence based approach including curative and palliative options. Participate in tumour board meetings to discuss options.
PO 18	Explain treatment options	Discuss with patients and family the surgical and nonsurgical options in view of expected prognosis, risks, outcomes, and quality of life.
PO 19	Perform appropriate Procedures	Discuss the surgical principles of resection of primary vertebral tumors Describe the principles of surgical tumor resection for metastatic tumors Perform spine stabilization and decompression in patients with neurological deficits and minimally invasive surgeries like vertebroplasty.
PO 20	Manage or prevent complications	Recognize the increased risk of wound problems in patients with debility, prior surgery radiation. Recognize the complications like neurological

		deterioration and take appropriate measures. To review the prognosis periodically and discuss with the patient.
Infection		
PO 21	To make a diagnosis	Describe the clinical features of and differences between pyogenic spondylodiscitis, epidural abscess, and spinal tuberculosis. Identify the surgical site infections following surgery at the earliest based on clinical features. Order and interpret hematological, microbiological, and imaging tests to confirm spinal infection
PO 22	Formulate a treatment plan	Identify preoperative risk factors for developing surgical-site infections after spine surgery anddiscuss the preventive strategies to minimize risks. Decide on appropriate antibiotics based on culture and sensitivity and antibiotic policy of hospital and in consultation with microbiologists whenever required. Consider surgical intervention for neurological compression, spinal instability, and debridement
PO 23	Explain treatment Options	Discuss with patients the indications for surgical intervention in spinal infection and the potentialrisks and benefits
PO 24	Perform appropriate procedures	Perform procedures based on evidence based approach like Debridement, decompression, reconstructionand fusion
PO 25	Manage or prevent complications	Manage post-infective complications, including deformity, loss of fixation, pseudarthrosis Emphasize and review patient compliance with frequency and duration of treatment Perform regular clinical and hematological review until resolution of the infection

Inflammatory spondyloarthropathy		
PO 26	To make a diagnosis	Assess the patient history, physical findings, disability, and quality of life in patients with suspected inflammatory spondyloarthropathy. Recognize the radiographic features of spinal instability or ankylosis
PO 27	Formulate a treatment plan	Describe the principles of medical management of inflammatory arthritis, to initiate appropriate medical management in consultation with rheumatologist using multidisciplinary approach. Describe surgical strategies in ankylosing spondylitis for kyphosis correction, fracture fixation, occipitocervical fusion.
PO 28	Explain treatment options to patients	Discuss with patients need for long term treatment, the indications for surgical intervention in spondyloarthropathy and thepotential risks and benefits
PO 29	Perform appropriate Procedures	Perform Surgical stabilization of fractures and fusion.
PO 30	Manage or prevent Complications	Identify Intraoperative and postoperative complications including risk of bleeding, neurological worsening, poor fixation due to associated osteoporosis and take appropriate measures.
Osteoporosis and fractures		
PO 31	To make a diagnosis	Recognize that acute vertebral and sacral fragility fractures may be associated with significant morbidity in the elderly List diagnostic tests and imaging modalities for assessing bone density Recognize the radiographic features of spinal fragility fractures Classify osteoporotic fractures of the spine and sacrum

PO 32	Formulate a treatment plan	Describe the medical management of osteoporosis Use an evidence based approach for the management of osteoporotic fractures including non operative and operative approaches.
PO 33	Explain treatment Options.	Discuss the relative risks and benefits of medical versus surgical treatment of acute vertebralfragility fractures. Discuss with patients complications associated with fragility fractures and benefits of the same.
PO 34	Perform appropriate Procedures	Perform surgical procedures like instrumentation, vertebroplasty for osteoporotic fractures.
PO 35	Manage or prevent Complications	Identify Intraoperative (cement leakage) and postoperative (neuro deficit) complications. Describe strategies for preventing future fractures
Research, Ethics and Quality improvement		
PO 36	Research as a lifelong learning tool	Participate in the department research activities as a member of research team. To conduct a research with appropriate research methodology and write a paper and initiate publication. To critically analyse the available literature for a given clinical problem and develop evidence based solutions.
PO 37	Participate in quality Improvement	Perform surgical audit on outcomes and complications Enroll patients in a registry/database
PO 38	Ethics	Demonstrate ability to recognize and manage ethical and professional conflicts

Abide by prescribed ethical and legal codes of conduct and practice

Teaching Learning Methods

Mode of teaching-learning methods for knowledge domain:

1. Seminars, Power point presentation submission by candidates (should cover entire syllabus).
2. Journal clubs (one per month),
3. Taking classes for the orthopedic post graduates.
4. Self-directed learning.

Teaching learning methods for the development of clinical competencies: Case based discussion

Small group teaching (one to one interaction) DOAP sessions

Participation as a member of team (Participatory learning).

The fellow will work as a member of team with following responsibilities.

1. Work as a member of team involved actively in management of patients including initial assessment, progress recording, participation in team meetings and rounds. Fellow will work directly under supervision of mentors.
2. Maintaining documentation for every patient admitted under spine unit.
3. Use of skill lab for skill training involving surgical procedures-Use DOAP method.
4. Case based discussions as per schedule (2 per week, One to one interaction).
5. Maintaining a portfolio of all the activities which includes a reflection on weekly basis summarising the learnings of the week and targets for the subsequent weeks.
6. Presentation in conferences.
7. Participate in all surgeries as team member.
8. Performing the surgical procedures under observation and later independently.
9. Case presentation/participation by the fellow in Interdepartmental meetings (pathology and radiology) one for 6 months.

ASSESSMENT

1. Formative assessment

*Evaluation and feedback of Seminar presentation – PPT (2 per month covering the topics mentioned in syllabus)

*Case based discussion- Grade of 8/10 in a minimum of 2 cases per month.

*Internal assessment at 6 months, score of minimum 60%

*Reflections on surgical procedures assisted and identification of goals, evaluated by the mentor.

All the academic activities and clinical and surgical work should be documented in the portfolio and must have reflections.

Evaluation of portfolio including reflections with a score of more than 60%

2. Research Project: Two research projects, which should be completed and sent for pubmed/scopus indexed Q1 journals publication and received a review.

3. Summative assessment -(Qualifying marks – 50%)

Pattern of examination

A. Theory examination 200 marks (100 marks short essays, 100 marks problem based)

B. Clinical examination (mapped for program objectives related to clinical examination, diagnosis and decision making)

Case presentation – two long cases, two short cases (200 marks, so 50 marks each)

C. OSCE- 5 stations 3 on skills, 2 on problem solving or clinical reasoning skills (100 Marks) (mapped for program objectives related to examination skills, decision making and counselling)

Books Recommended

1. The spine; Rothmon and Simeone
2. Spine surgery: techniques, complication avoidance and management – Benzel, Edward.
3. Operative techniques – spine surgery – Vaccaro, Alexander
4. ASSI textbook on spinal infections and trauma, Dr. S Rajasekaran.
5. Operative techniques in spine surgery: Dr. Bhavuk Garg.

Journals:

1. Spine
2. Global spine journal
3. European spine journal
4. Indian spine journal.
5. Asian spine journal.

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BLUE PRINT FOR SPINE FELLOWSHIP EXAMINATION

Theory (100+100)

Paper 1: Short Essays

Paper 2: Problem based questions.

Broad headings under program outcomes	**Marks allocated**
Basics Anatomy and biomechanics. Congenital disorders. Research and ethics. Attitude and communication.	20
Degenerative disorders of spine	20
Spinal infections	10
Spinal tumours and metastasis.	10
Spinal trauma	10
Inflammatory disorders.	10
Osteoporosis	10
Spinal deformity.	10

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Model Question paper for the Spine fellowship University examination

Paper 1

Answer all questions Duration 3 hours

Write diagrams wherever necessary

Short essays **Marks 10x10**

1) Discuss the pathophysiology of atlantoaxial dislocation and management.
2) Describe the embryological development of the vertebral column and spinal cord.
3) Discuss the clinical and radiological evaluation of scoliosis. How do you classify and briefly describe indications for surgery in adolescent idiopathic scoliosis
4) How do you evaluate spinal instability, Describe various classification systems used for spinal metastasis.
5) What are spine at risk signs in tuberculosis, Describe in detail methods used for anterior reconstruction of vertebral defects in spinal tuberculosis.
6) Discuss the various classification systems used for thoracolumbar trauma. Describe newer methods of rehabilitation of paraplegic patients.
7) Critically evaluate the current evidence for the use of biologics (e.g., rhBMP-2) in spinal fusion surgeries. Discuss indications, risks, and controversies.
8) Discuss the current trends in diagnosis and treatment of post menopausal osteoporosis with a brief on management of an osteoporotic fracture in the thoracolumbar spine.
9) Outline the components of a quality research paper in spine surgery. Design a randomised control trial between the outcomes of microscopic vs endoscopic surgery in lumbar degenerative disc disease.
10) Discuss in detail prognostic factors and outcome of patients with cervical myelopathy.

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Model Question paper for Spine fellowship University examination

Paper 2

Answer all questions Duration 3 hours

Write diagrams wherever necessary

Problem based questions **Marks 10x10**

1) A 55 yr old patient suffers an RTA following which he has severe neck pain with weakness in both upper and lower limbs how will you proceed in this patient, enumerate the workflow from resuscitation to definitive treatment.
2) A 65 year patient presents in casualty with acute onset B/L EHL and EDL weakness with saddle anaesthesia and bowel and bladder incontinence. How will you approach this particular patient with regards to diagnosis and management? Write a note on autonomic bladder.
3) A 42 year old male is undergoing discectomy, suddenly you notice a dural tear with CSF leak, how will you proceed.
4) During a surgery for spondylolisthesis, you notice that screw is breaching into medial cortex, how do you proceed, explain with scientific reasoning.
5) A 61 year old female presents with low back pain and instability, x rays reveal spondylolisthesis, how will you evaluate this patient and treat the patient.
6) A 50 year old patient presents with a stiff spine and difficulty in gaze. Describe in detail the evaluation and management strategies for this patient.
7) A 48-year-old male presents with a 6-month history of dull, aching pain in the lower back and coccygeal region, worsening while sitting. There is no significant trauma history. He reports occasional bowel disturbances but no bladder symptoms. On examination, there is deep tenderness over the coccyx, but no neurological deficits. MRI pelvis reveals a lobulated, midline, T2 hyperintense, heterogeneously enhancing mass centered on the coccyx with bone destruction and minimal anterior soft tissue extension. CT confirms bony erosion of the coccyx and lower sacrum.As a spine surgeon, outline your comprehensive management plan for this patient, discussing the following aspects: • Differential diagnosis and key features of the tumor. • Role and risks of biopsy in this condition. • Principles of surgical management, Prognostic factors and long-term follow-up considerations.

8) A 70 year old patient presents with neck pain radiating to b/l upper limbs, difficulty in buttoning his shirt and frequent falls, there is no history suggestive of infections or tumour. What is the most likely diagnosis, how do you counsel this patient regarding prognosis and complications, what are the key issues during surgery to be addressed and surgical techniques.
9) A 30 year old patient sustains injury to his pelvis post RTA and sustains a sacral fracture. During OT discussion there was a discussion about lumbosacral fixation, how do you participate in the discussion based on evidence based approach.
10) A 35 year old female underwent discectomy 6 months back, comes back with new onset of radicular pain in the same region and back pain, discuss possible causes and management plan.