

**Paper II - Technical Subject**

**I. Basic Science**

**1. Anatomy**

- 1.1. Embryology of spine: Development of dermatomes, myotomes, nerve roots and spinal cord
- 1.2. Structure and biomechanics of craniovertebral junction
- 1.3. Ligaments of upper cervical spine
- 1.4. Anatomy of atlas and axis
- 1.5. Anatomy of subaxial spine
- 1.6. Anatomy of thoracic spine
- 1.7. Anatomy of lumbar spine
- 1.8. Anatomy of sacrum and coccyx
- 1.9. Anatomy of brachial and lumbosacral plexuses and peripheral nerves
- 1.10. Concept of dermatomes and myotomes

**2. Physiology**

- 2.1. Physiology of cerebrospinal fluid circulation
- 2.2. Myelopathy and radiculopathy
- 2.3. Biomechanics of spine:
  - 2.3.1. Normal curvatures
  - 2.3.2. Saggital/coronal balance
  - 2.3.3. Physiological loads
  - 2.3.4. Concept of stability
  - 2.3.5. Principal of spinal instrumentations
- 2.4. Physiology of bladder and bowel function
- 2.5. Physiology of sexual function
- 2.6. Nutrition status in spine patients
- 2.7. Age related changes in spine
- 2.8. Pathways of spinal pains

**3. Pathology**

- 3.1. Basic pathologies involving the spine
- 3.2. Congenital anomalies: congenital scoliosis, hemivertebra, Klippel-Feil deformity
- 3.3. Craniovertebral anomalies, basilar invagination
- 3.4. Traumatic syndromes of spine
- 3.5. Tumors involving vertebral column and spinal cord
- 3.6. Degenerative diseases of spine
- 3.7. Pathology of different pain syndromes
- 3.8. Infections of spine
- 3.9. Neuromuscular disorders
- 3.10. Different neurologic bladder syndromes

## लोक सेवा आयोग

नेपाल स्वास्थ्य सेवा, सर्जरी समूह, स्पाइनल सर्जरी उपसमूह, नवौं (९) तह, कन्सल्टेन्ट स्पाइनल सर्जन पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

### 4. Pharmacology

- 4.1. Steroids: indication and contraindications
- 4.2. Analgesics use in spinal injury and pain syndrome

## II. Principles and practice (Clinical features, diagnosis and nonoperative management)

### 5. Common presentations of spine cases (Patient Assessment)

- 5.1. Pain
  - 2.3.6. Causes of pain
  - 2.3.7. Characteristics of pain in relation to anatomical origin of pain
  - 2.3.8. Radicular pain
  - 2.3.9. Claudication
- 5.2. Stiffness / spasticity
- 5.3. Deformity
  - 5.3.1. Scoliosis/Kyphosis, gibbus/Kyphoscoliosis/List/Torticollis/Hump
- 5.4. Neurological deficits
  - 5.4.1. Monoplegia/Hemiplegia/Paraplegia/Quadriplegia
  - 5.4.2. Grading of neurological deficits: Frankel grading/ ASIA grading
- 5.5. Types of partial cord injuries (Brown Sequard syndrome, anterior cord syndrome, posterior cord syndrome, central cord syndrome)
- 5.6. Conus medullaris syndrome
- 5.7. Cauda equina syndrome
- 5.8. Myelopathies (cervical and thoracic)
- 5.9. Spinal dysrrhaphisms
- 5.10. Bowel and bladder dysfunctions
- 5.11. Sexual dysfunctions
- 5.12. Swellings on back and other cutaneous signs
- 5.13. Knowledge on Yellow flag and Red flag signs in spine
- 5.14. Associated co-morbidities related to spinal diseases

### 6. Examination of the Spine

- 6.1. General examination of Spine
  - 6.1.1. Inspection
    - 6.1.1.1. Any obvious swellings or surgical scars, dimples, tufts of hair
    - 6.1.1.2. Deformity: scoliosis, kyphosis, loss of lumbar lordosis or hyperlordosis of the lumbar spine.
    - 6.1.1.3. Shoulder asymmetry and pelvic tilt
    - 6.1.1.4. Gait and attitude
  - 6.1.2. Palpation
    - 6.1.2.1. Tenderness over bone and soft tissues, step off deformity

## लोक सेवा आयोग

नेपाल स्वास्थ्य सेवा, सर्जरी समूह, स्पाइनल सर्जरी उपसमूह, नवौं (९) तह, कन्सल्टेन्ट स्पाइनल सर्जन पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 6.1.2.2. Digital rectal examination
- 6.1.3. Movement
  - 6.1.3.1. Ranges of movement of major joints
  - 6.1.3.2. Examination of the shoulders and examination of the sacroiliac joints and hips
- 6.2. Neurological Assessment in spinal disorders
  - 6.2.1. Examination of cranial nerves, motor and sensory systems including peripheral nerves
  - 6.2.2. Deep tendon reflexes/cutaneous reflexes/abdominal reflexes
  - 6.2.3. Examination for cerebellar dysfunctions
- 6.3. Vascular examination
  - 6.3.1. Peripheral vascular examination
- 6.4. Psychosocial factors
  - 6.4.1. Waddell's sign
- 6.5. Movements (normal ranges)
  - 6.5.1. Flexion: Schober's test
  - 6.5.2. Extension; Lateral flexion, rotation
  - 6.5.3. Straight leg raising test, Bowstring test, Lasegue's sign, femoral stretch test
- 6.6. Chest examination
- 6.7. Abdominal and cardiovascular examinations
  - 6.7.1. Non-musculoskeletal causes of back pain - e.g., urological, gynaecological, gastrointestinal and vascular
  - 6.7.2. Primary malignancy sites
- 7. Investigations**
  - 7.1. Laboratory investigations
    - 7.1.1 Basic hematological and biochemical tests
    - 7.1.2 Rheumatologic profile
    - 7.1.3 Immunological tests
    - 7.1.4 Understandings on microbiology: staining, culture and sensitivity of common microorganisms affecting spine
    - 7.1.5 Genetic tests
    - 7.1.6 Principles and interpretation of histopathology
    - 7.1.7 Immuno-histochemistry of commonly diagnosed spinal diseases
  - 7.2. Imaging studies in spine
    - 7.2.1 Plain X-ray
    - 7.2.2 Tomography
    - 7.2.3 Ultrasonography
    - 7.2.4 CT scan

## लोक सेवा आयोग

नेपाल स्वास्थ्य सेवा, सर्जरी समूह, स्पाइनल सर्जरी उपसमूह, नवौं (९) तह, कन्सल्टेन्ट स्पाइनल सर्जन पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 7.2.5 Bone scan
- 7.2.6 MRI
- 7.2.7 Fluoroscopy
- 7.2.8 Latest imaging technologies: PET, SPECT
- 7.3. Neuro physiological investigations
- 7.4. Spinal injections
- 8. Management of spine diseases**
  - 8.1. Congenital, traumatic, infective/inflammatory, degenerative, neoplastic, metabolic, mechanical, disc prolapse, spondylolisthesis, spondylolysis
  - 8.2. Grading and scoring in spinal diseases
    - 8.2.1 Concept of spinal instability
    - 8.2.2 ASIA, TLICS, SLICS, AO, JOA score, Nurick score, ODI, VAS
  - 8.3. Non-surgical Management
    - 8.3.1 Principle of management
    - 8.3.2 Indications
    - 8.3.3 Pain management
    - 8.3.4 Physiotherapy
    - 8.3.5 Bracing, corset
    - 8.3.6 Skull traction
    - 8.3.7 Halo vest, traction
    - 8.3.8 Principles of post acute care and rehabilitation

### III. Operative Spine Surgery

#### 9. Positioning in spine surgery

#### 10. Surgical approaches

- 10.1. Cervical spine
  - 10.1.1 Upper cervical spine – C0/1/2 exposure
  - 10.1.2 Smith Robinson approach – related complications
  - 10.1.3 Anterior odontoid (trans oral) and manubrium splitting approach
  - 10.1.4 Management of vascular complications in cervical spine
  - 10.1.5 Anterior and posterior approaches to the cervical spine
- 10.2. Thoracic spine
  - 10.2.1 Principles of thoracotomy in relation to spine surgery
  - 10.2.2 Thoracotomy approach and thoraco-abdominal approach
  - 10.2.3 Anterolateral approach
  - 10.2.4 Costotransversectomy
- 10.3. Lumbar spine
  - 10.3.1 Anterolateral retroperitoneal approach to lumbar spine
  - 10.3.2 Posterior approach in lumbar spine
  - 10.3.3 Wiltse approach in lumbar spine

## लोक सेवा आयोग

नेपाल स्वास्थ्य सेवा, सर्जरी समूह, स्पाइनल सर्जरी उपसमूह, नवौं (९) तह, कन्सल्टेन्ट स्पाइनल सर्जन पदको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 10.4. Spinal biopsy techniques – open and percutaneous
- 10.5. Peri/Post operative management
  - 10.5.1 Pre-operative assessment
  - 10.5.2 Intra operative anesthesia management
  - 10.5.3 Post operative care & pain management

## 11. Techniques

- 11.1 Cervical spine
  - 11.1.1 Cranio-vertebral junction – Chiari malformations and basilar invagination – treatment protocols
  - 11.1.2 Pearls and pitfalls in C0/1/2 techniques
  - 11.1.3 Sub axial lateral mass and pedicle screw techniques
  - 11.1.4 ACDF/ACCF complications
  - 11.1.5 Laminoplasty and laminectomy techniques
  - 11.1.6 Difficulties in anterior odontoid screw fixation
  - 11.1.7 Triple wiring techniques in upper and subaxial cervical spine
  - 11.1.8 Ossification of ligamentum flavum and ossification of posterior longitudinal ligament (OYL and OPLL)
- 11.2 Thoracic spine
  - 11.2.1 Thoracic disc herniation – surgical techniques
  - 11.2.2 AIS – approaches and surgical techniques
  - 11.2.3 Scheurmann's kyphosis – treatment protocol
- 11.3 Lumbar spine
  - 11.3.1 Surgical management of thoraco-lumbar trauma
  - 11.3.2 Adult spinal deformity – operative treatment
  - 11.3.3 Lumbar disc herniation and cauda equine syndrome
  - 11.3.4 Lumbar spine stenosis
  - 11.3.5 Lumbar spondylolisthesis – treatment techniques
  - 11.3.6 Bony and spinal tumors – surgical techniques
  - 11.3.7 Management of dural tears
  - 11.3.8 Metastatic / bony spine tumors – operative management
  - 11.3.9 Pseudoarthrosis and PJK – treatment methods
  - 11.3.10 Sacral and coccygeal trauma – surgical fixation methods
  - 11.3.11 Meningocele and meningocele – treatment methods
- 11.4 Minimally invasive spine surgery
  - 11.4.1. Posterior cervical foraminotomy
  - 11.4.2. Percutaneous pedicle screw fixation in thoracic and lumbar spine
  - 11.4.3. MISS TLIF
  - 11.4.4. Endoscopic spine surgery
- 11.5 Management of post-operative complications

#### **IV. Recent Advances**

##### **12. Trauma**

- 12.1. Role of early surgery (within 72 hours) versus delayed surgery in acute cervical spinal cord injury
- 12.2. Role of C1-C2 wiring alone in the treatment of traumatic atlanto axial subluxation
- 12.3. Recent trend in the surgical treatment of Odontoid fractures
- 12.4. Role of steroids in acute spinal cord injury
- 12.5. Recent advances in spinal cord injury rehabilitation
- 12.6. Link between spinal cord recovery and high blood pressure
- 12.7. Spinal cord epidural stimulation (ScES) treatment
- 12.8. Human stem cell therapy and spinal cord regeneration

##### **13. Tumor**

- 13.1. Intradural tumors/Primary tumors of spine, spinal metastasis
- 13.2. The significance of grade, age, and extent of surgical resection with overall survival and cause-specific survival for both astrocytomas and ependymomas of spinal cord
- 13.3. The role of radiotherapy and chemotherapy in pediatric spinal intramedullary tumors
- 13.4. The indications of craniospinal irradiation in spinal tumors

##### **14. Degenerative**

- 14.1. Role of decompressive surgery and ventral versus dorsal approaches for the surgical management of cervical spondylotic myelopathy
- 14.2. Role of laminoplasty and laminoplasty baskets in cervical canal stenosis
- 14.3. Timing of surgery for cauda equina syndrome
- 14.4. The prevalence and significance of posticus ponticus in humans
- 14.5. Role of atlanto axial joint distraction as a treatment of basilar invagination
- 14.6. Surgical treatments of Chiari malformation 'I'
- 14.7. Recent advances in surgical treatment in elderly and osteoporotic spine

##### **15. Miscellaneous**

- 15.1. Role of neuromonitoring in spinal surgery
- 15.2. Role of Neuro Navigation in spinal surgery
- 15.3. Role of Robotic Surgery in spinal Surgery
- 15.4. USG guided root block/facet block/medial branch block in radiculopathy
- 15.5. MIS in the treatment of spinal infections

##### **16. Outcome assessment in spine surgery**

- 16.1. Pain :general aspects & instrumentation
- 16.2. Disability
- 16.3. Quality of safe
- 16.4. Psychological aspects work satisfactions/fear
- 16.5. Avoidance belief