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 junctuion
   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
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
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
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
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 Meningcele and meningomyelocele – 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