McMaster Orthopedic Surgery Adult Spine Rotation

OBJECTIVES

Residents will master, in an incremental fashion, the fundamental cognitive and technical skills required to treat patients with degenerative, traumatic, neoplastic and infectious spine disorders (Appendix 1 and 2).

SCHEDULE

Residents will engage in clinical activities with all spine attendings (ie. not preceptor model). The rotation lead will set schedules and assignments weekly. These will vary, but on average 50% of week will be in OR and 50% in clinic.

DUTIES

Patient Care

- All acute/active on- and off-service patients must be seen before sign-over at 06:45
    - Focused neuro exam per ASIA standards in chart
    - Look for relevant complications (eg. Airway obstruction after ACDF)
- Before daytime activities start
    - Appropriately update attendings on their patients
    - For patients followed by Spine NPs, handover tasks
- "Chart" rounds in pm before going home to tie up loose ends, in person rounds prn
    - Liaise with Spine NPs before going home
- Maintain a team communication list of patients being followed in hospital.
    - Share with residents covering overnight and weekend
    - Verbal handover of developing issues to night resident
    - Verbal handover of all patients to weekend resident

Clinic

- Be in clinic on time
- Provide compassionate, patient-centered and courteous care
- Actively participate in running an efficient clinic
- Thorough history, physical, and imaging interpretation
- Develop a comprehensive plan before presenting to attending
- Timely, articulate, and thorough dictation

Operating Room

- Approach the day as though the attending will not be there
- Meet and assess OR patients in a timely way
    - This means seeing 1st patient of day BEFORE 07:50
    - Make sure consent is present, all paperwork done, no outstanding medical issues, etc.
    - Examine patient, and document a focused neuro exam per ASIA standards in chart
    - Present PowerPoint operative plan to attending before start of case
        - Include clinical history
        - Plan decompression and screws
    - Load imaging on OR computers
    - Help set-up room

- Help position patient

- Reliable post-operative focused neuro examination must be done and document in chart
  - Reliable means patient is at baseline mental status
  - Wean sedation if still intubated
  - If slow to rouse from anesthesia, etc, hand over to resident on call to examine.
    - If there is a neurologic change, notify attending

On Call/Add On-List

- A significant proportion of spine surgical volume is from on-call work. Spine call is unique in that it involves handover between Neurosurgery and Orthopaedics
- Residents are expected to know the add-on cases, ensure patients are ready for the OR (labs and imaging), and have an operative plan for patients on the board when Orthopaedics is on call – regardless of admitting service
- Orthopedic residents should work collaboratively with the Neurosurgery team to achieve smooth handovers

ACADEMICS

- Keep-up with assigned reading on OneDrive
- Prepare a 15min presentation on weekly topic to be given at Monday am rounds

Week 1:	Spine Basics
Week 2:	Surgical Techniques
Week 3:	Degenerative Lumbar Conditions
Week 4:	Degenerative Cervical Conditions
Week 5:	Thoracic Spine
Week 6:	Cervical Trauma
Week 7:	Thoracolumbar Trauma
Week 8:	Spinal Infections
Week 9:	Spinal Oncology
Week 10:	Spinal Deformity
Week 11:	Rheumatologic Conditions and the Spine
Week 12:	Failed Spine Surgery

EVALUATION

Medical Expert

Rotation objective in this domain are listed in Appendix 1 for junior residents, and in Appendix 2 for senior residents.

Communicator

The resident will be expected to ESTABLISH and maintain therapeutic relationships with both patients and their families. Communication will be assessed in both written and verbal areas. A PATIENT ENCOUNTER FORM will be given to an undisclosed patient(s) to assess the patients perception of the encounter.

Areas of evaluation include:

1. The ability to take a focused history (observed H&P)
2. listening skills
3. information delivery to patients/family, e.g. informed consents
4. Information delivery to colleagues, progress notes, orders etc. (random assessment of documentation)

The spine rotation will emphasize a patient centered approach in which the resident will be allowed to develop competency in learning to modify and explain information in a way that meets the needs of the individual patient. For assessment purposes the preceptor may require an arena of predetermined specific learning cases e.g. end of life discussion in hip fracture, changing level of care in the ICU patient, or dealing with a physician as patient for example.

Collaborator

The resident will be required to demonstrate an ability to interact with all other health care professionals including family, nursing and other physicians. Respect for the roles of other professionals will be an important component of this area.

This area will be assessed through;

1. feedback from nursing staff
2. information from other multidisciplinary team members
3. Other physician input.
4. 360Deg Evaluation.

Assessment of the resident in this area may be best objectified through specific minor projects. e.g.

1. Collaborate with physio to design a post op protocol
2. Collaborate with nursing regarding a patient safety issue
3. Design a common wait list strategy for partners in a community setting

Leader

The expectation of the resident is to utilize resources to balance patient care and to allocate finite resources wisely.

The resident will also be assessed in the ability to balance personal and professional activities and use their time to optimize patient care and CME.

Office administration, practice management and billing will be reviewed.
Assessment:

1. Ability to utilize resources wisely
2. Ability to time manage time correctly; promptness, prioritizing etc.
3. Administrative ability;

The spine rotation provides an excellent arena to teach and discuss practice management along with other managerial skills. Topics for review in this arena include;

1. Negotiation skills
2. Committee responsibilities e.g. role of the chair, Roberts rules, perhaps have the resident attend a meeting and discuss the interactions
3. How to get and give references
4. Practice efficiency; Hospital, house and office
5. Managing length of stay and waitlist.

Scholar

The resident will demonstrate the abilities to ASSESS, APPRAISE, ACQUIRE and CONTRIBUTE to lifelong learning. Scholarship relates to the self-discipline of evaluating, reporting and incorporating new evidence into practice.

This will be assessed through.

1. The ability of the resident to incorporate self-directed as well as preceptor directed specific learning goals throughout the rotation.
2. The ability of the resident to teach other health professionals in order to enhance patient care.
3. The resident's ability to integrate new research into practices.
4. The residents' ability to critically appraise their knowledge base, and procedural techniques.

Evaluating of this area is once again difficult. The resident perhaps could be required to search out an evidence based change which could be incorporated into the practice where he/ she is located.

Health Advocate

The resident is expected to consistently advocate for the health and care of the patient. This includes an ability to identify the important determinants of health care for the patient, both orthopedic and non-orthopedic. The resident should develop an understanding for the role of the surgeon in the health care system. This includes the role of the physician in recognizing and describing the health needs of the population.

This will be assesses though

1. the resident interaction with the patient requiring concurrent care issues
2. the resident's ability to negotiate for limited resources in patient prioritizing

It is imperative that the resident understands the need for advocacy of the patient as a group as well as an individual. Individual advocacy is usually well established in the early medical career but group advocacy integrates much later in practice.

In this arena evaluation is difficult; perhaps exposure to such areas as, speaking to the hospital foundation, administration, or the media could be covered.

Professional
The resident will be expected in this rotation to adhere to a high standard of honesty, integrity, commitment, compassion, effectiveness, competence and altruism.

Other areas of professional behavior to be assessed are manners, presentation skills, personal appearance, utilization of feedback and other evaluation tools.

Self-regulation in these areas is imperative. The resident will be expected to be accountable for all behaviors and recognize the boundaries between professional and personal realms.

Professionalism also includes self- directed learning and evaluation. This may be assessed through:
- personal learning projects
- creation of learning objective for the rotation
- self-assessment skills and simulation.

APPENDIX 1: JUNIOR RESIDENT ROTATION OBJECTIVES[1]

At the completion of this rotation, the trainee will be able to:

General

1.1.1 Demonstrate a comprehensive knowledge of the anatomy and physiology of the spine and the nervous system as is pertinent to the management of spine and spinal cord pathology.

1.1.2 Demonstrate the ability to conduct a thorough history and physical examination for various chief complaints that pertain to the spine.

- know the motor and sensory distribution of the major roots (C4-8 and L2-S4) and how to examine for them
- understand the straight-leg raising test and what it means - limitations, accuracy
- know basic long tract signs and what they mean (Hoffman's, Babinski, clonus)
- understand the concept of sacral sparing in trauma
- effective listening to patients and families
- appropriate respect for patient confidentiality and privacy
- accurate documentation of patient encounters

1.1.3 Be able to construct an appropriate differential diagnosis for a variety of spine complaints.

- understand the RED FLAGS in low back pain
- know Waddell's criteria and their significance

1.1.4 Demonstrate the ability to cooperate with other physicians as well as allied health professionals in the creation and implementation of a patient focused plan of spine care.

- understand the differences between disease, pain and disability
- understand the concept of secondary gain

1.1.5 Understand the principles of imaging assessments including, plain radiography, CT, and MRI.

Investigations:

1.2.1 Demonstrate an in-depth understanding and the ability to select and interpret various investigations to be used in the work-up of a patient, including but not limited to blood work, plain radiography, radionucleotide scans, CT, myelograms, angiograms, MRI, and EMG.

Trauma/Emergency:

1.3.1 Recognize the need for urgent immobilization of the spine when instability is suspected.

1.3.2 Demonstrate knowledge in clearing a trauma patient of spinal injury according to ATLS guidelines including recognition and management of neurogenic shock, unless competency previously attained during surgical residency.

1.3.3 Demonstrate the ability to classify injuries according to fracture morphology, instability, and neurological status.

- AOSpine Classification Systems
- SLICS Score
- TLICS Score

[1] Adapted from: Larouche J, Yee AJM, Wadey V, et al (2016) Development of a competence-based spine surgery fellowship curriculum set of learning objectives in Canada. Spine (Phila Pa 1976) 41:530–537. https://doi.org/10.1097/BRS.0000000000001251

1.3.4 Demonstrate the ability to apply the ASIA score, identify spinal shock, and consider the prognostic importance of sacral sparing.

1.3.5 Recognize emergency conditions (specifically acute cauda equina syndrome, acute neurological deterioration, acute traumatic spinal cord injury) with knowledge of evidence based medicine of outcomes relating to timing of surgery.

Spine Oncology/Vascular Conditions

1.4.1 Demonstrate knowledge of the symptoms and signs of primary and metastatic spinal tumors.

1.4.2 Being competent in the local and systemic staging of spinal tumors, whether primary tumors or metastatic.

Spine Deformity:

1.5.1 Demonstrate the ability to perform a history and physical examination appropriate for a patient presenting with spinal deformity.

1.5.2 Demonstrate the ability to describe the classification systems for spondylolisthesis and scoliosis.

a. Wiltse classification for spondylolisthesis
b. King and Lenke classifications for adolescent idiopathic scoliosis

Spinal Infection

1.6.1 Demonstrate the ability to prescribe the appropriate evidence-based medical therapy relating to pre-operative and peri-operative antibiotic prophylaxis in spine surgery.

1.6.2 Demonstrate the ability to perform an appropriate history and physical examination in situations where primary, secondary, or post-operative spinal infection is suspected.

Degenerative:

1.7.1 Demonstrate a comprehensive knowledge of the diagnosis and treatment of degenerative spinal disease.

1.7.2 Demonstrate the ability to use evidence-based medicine decisions when making recommendations regarding operative versus non-operative treatment of the degenerative spine.

1.7.3 Demonstrate proficiency in the diagnosis and knowledge of medical and surgical management for degenerative disc disease, including neurologic effects such as radiculopathy, neurogenic claudication, and cauda equina syndrome.

Pain Management/ Rehabilitation / Recovery

1.8.1 Demonstrate an ability to diagnose as well as demonstrate knowledge on the appropriate management of a variety of pain conditions relating to the spine, including the ability to refer to allied health professionals and cooperate in the establishment of a multidisciplinary medical/surgical treatment plan.

CanMED Intrinsic Roles:

1.9.1 Demonstrate professionalism by consistently demonstrating a commitment to your patients, profession, and society through ethical practices at all times.

Procedural Competencies

Demonstrate Proficiency in:

2.1.1 patient positioning, prepping and draping.
2.1.2 bone graft harvesting techniques.
2.1.3 techniques to maintain cervical spine precautions during prone positioning (ie Jackson table with Mayfield pins and adaptor).
2.1.4 Identifying anatomic landmarks and technique for common approaches – A/P neck, posterior thoracic, posterior lumbar

C-Spine

2.2.1 Demonstrate proficiency in the posterior approach to the cervical spine.

T-Spine

2.3.1 Demonstrate proficiency in the posterior approach to the thoracic spine.

Lumbrosacral Spine

2.4.1 Demonstrate proficiency in the posterior approach to the lumbar spine.

APPENDIX 2: SENIOR RESIDENT ROTATION OBJECTIVES[2]

At the completion of this rotation, the trainee will be able to:

General

2.1.1 Demonstrate a comprehensive knowledge of the anatomy and physiology of the spine and the nervous system as is pertinent to the management of spine and spinal cord pathology.
- understand the bulbocavernosus reflex and its importance, normal/abnormal
- understand the spectrum of cauda equina syndrome and issues in timing/urgency

2.1.2 Demonstrate a comprehensive knowledge of clinical features including signs, symptoms, natural history, and prognosis of spinal traumatic, infectious, metabolic, neoplastic, degenerative, developmental, and congenital spinal disorders.

2.1.3 Demonstrate the ability to conduct a thorough history and physical examination for various chief complaints that pertain to the spine.

2.1.4 Be able to construct an appropriate differential diagnosis for a variety of spine complaints.
- distinguish somatic/neuropathic pain, allodynia
- perioperative pain control/narcotics use-and-abuse, multimodality, habituation versus addiction, weaning

2.1.5 Demonstrate the ability to cooperate with other physicians as well as allied health professionals in the creation and implementation of a patient focused plan of spine care.

2.1.6 Understand the principles of imaging assessments including, plain radiography, radionucleotide scans, CT, PET, SPECT/CT, and MRI.

2.1.7 Understand the principals of spinal fixation
- understand loading behavior/limitations of anterior/posterior spine constructs
- discuss strategies to optimize screw fixation strength

2.1.8 Discuss technique for odontoid and C1/2 screws, anterior screw fixation in the C/T/L spine

Investigations:

2.2.1 Demonstrate an in-depth understanding and the ability to select and interpret various investigations to be used in the work-up of a patient, including but not limited to blood work, plain radiography, radionucleotide scans, CT, myelograms, angiograms, MRI, and EMG.

2.2.2 Recognize the radiographic signs of degenerative, neoplastic, traumatic, developmental and congenital spinal instability.

Trauma/Emergency:

2.3.1 Recognize the need for urgent immobilization of the spine when instability is suspected.

2.3.2 Demonstrate knowledge in clearing a trauma patient of spinal injury according to ATLS guidelines including recognition and management of neurogenic shock, unless competency previously attained during surgical residency.

2.3.3 Demonstrate the ability to classify injuries according to fracture morphology, instability, and neurological status.

[2] Adapted from: Larouche J, Yee AJM, Wadey V, et al (2016) Development of a competence-based spine surgery fellowship curriculum set of learning objectives in Canada. Spine (Phila Pa 1976) 41:530–537. https://doi.org/10.1097/BRS.0000000000001251

2.3.4 Demonstrate the ability to apply the ASIA score, identify spinal shock, and consider the prognostic importance of sacral sparing.
2.3.5 Identify syndromes of spinal cord injury, including complete transverse injury, anterior cord injury, Brown-Sequard injury, central cord injury, posterior cord injury, cruciate paralysis, syringomyelia, conus syndrome, and sacral sparing.
2.3.6 Discuss the indications for acute reduction, decompression, and stabilization as appropriate in the setting of a polytraumatized patient.
- plan and do implant constructs for common injuries
- discuss issues in timing versus prognosis for neurological recovery
- discuss issues in timing of surgery for thoracolumbar ORIF in polytrauma

2.3.7 Discuss non-operative and operative treatment options for fractures and dislocations affecting the spine.
2.3.8 Recognize emergency conditions (specifically acute cauda equina syndrome, acute neurological deterioration, acute traumatic spinal cord injury) with knowledge of evidence based medicine of outcomes relating to timing of surgery.

Spine Oncology/Vascular Conditions

2.4.1 Demonstrate knowledge of the symptoms and signs of primary and metastatic spinal tumors.
2.4.2 Be competent in establishing a diagnosis of neoplastic spine disease; specifically the early provisional diagnosis of a primary vertebral extra-dural tumor versus metastatic tumor as well as those intra-dural (intramedullary/extramedullary) tumors that affect the spine based on clinical presentation and imaging.
2.4.3 Being competent in the local and systemic staging of spinal tumors, whether primary tumors or metastatic.
2.4.4 Demonstrate knowledge of options in medical management for spinal metastatic disease including the use of radiation therapy and medications to treat the symptoms of and lessen the complications of skeletal related events (SREs).
2.4.5 Demonstrate the ability to recognize and classify spinal instability in spine oncology (e.g. grading systems such as Spine Instability Neoplastic Score (SINS)).

Spine Deformity:

2.5.1 Demonstrate the ability to perform a history and physical examination appropriate for a patient presenting with spinal deformity.
2.5.2 Demonstrate the ability to describe the classification systems for scoliosis, kyphosis, and spondylolisthesis, and craniocervical deformities.
2.5.3 Demonstrate the ability to diagnose as well as demonstrate knowledge relating to the management options for spondylolisthesis, spondylolysis, and spondyloptosis

Spinal Infection

2.6.1 Demonstrate the ability to prescribe the appropriate evidence-based medical therapy relating to pre-operative and peri-operative antibiotic prophylaxis in spine surgery.
2.6.2 Demonstrate the ability to perform an appropriate history and physical examination in situations where primary, secondary, or post-operative spinal infection is suspected.
2.6.3 Demonstrate the ability to order and interpret appropriate diagnostic tests to confirm infection and identify the causative organism.

2.6.4 Demonstrate knowledge on the recommended medical management of infectious lesions of the spine, such as vertebral osteomyelitis, discitis, and epidural abscesses.

Auto-immune/genetic:

2.7.1 Recognize the symptoms and signs of inflammatory disorders of the spine such as ankylosing spondylitis and Diffuse Idiopathic Skeletal Hyperostosis (DISH).

2.7.2 Demonstrate knowledge of the medical and surgical management of cervical disease secondary to rheumatoid arthritis.

Degenerative:

2.8.1 Demonstrate a comprehensive knowledge of the diagnosis and treatment of degenerative spinal disease.

2.8.2 Demonstrate the ability to use evidence-based medicine decisions when making recommendations regarding operative versus non-operative treatment of the degenerative spine.

2.8.3 Demonstrate proficiency in the diagnosis and knowledge of medical and surgical management for degenerative disc disease, including neurologic effects such as radiculopathy, neurogenic claudication, and cauda equina syndrome.

2.8.4 Demonstrate the ability to compare and contrast the surgical treatment options for cervical spondylotic myelopathy and ossification of the posterior longitudinal ligament, including knowledge of procedures such as multilevel anterior cervical corpectomy and fusion, laminectomy, laminectomy and fusion, and laminoplasty.

Pain Management/ Rehabilitation / Recovery

2.9.1 Demonstrate an ability to diagnose as well as demonstrate knowledge on the appropriate management of a variety of pain conditions relating to the spine, including the ability to refer to allied health professionals and cooperate in the establishment of a multidisciplinary medical/surgical treatment plan.

CanMED Intrinsic Roles:

2.10.1 Demonstrate professionalism by consistently demonstrating a commitment to your patients, profession, and society through ethical practices at all times.

2.10.2 Demonstrate compassion and professionalism when delivering bad news to a spine patient.

2.10.3 Demonstrate effective delivery of information to patients to allow / encourage discussion and informed decision making.

2.10.4 Demonstrate ability to deal with challenging communication issues/ e.g. angry family, miscommunication, poor prognosis etc.

Procedural Competencies

Demonstrate Proficiency in:

3.1.1 patient positioning, prepping and draping.
microscope use.

3.1.2 bone graft harvesting techniques.

3.1.3 techniques to maintain cervical spine precautions during prone positioning (ie Jackson table with Mayfield pins and adaptor).

C-Spine

3.2.1 Demonstrate proficiency in the posterior approach to the cervical spine.

3.2.2 Demonstrate proficiency in the ability to implant cervical lateral mass screws, including plate/screw and rod/screw instrumented constructs.

T-Spine

3.3.1 Demonstrate proficiency in the posterior approach to the thoracic spine.

3.3.2 Demonstrate the ability to properly place pedicle screws in the thoracic spine.

Lumbosacral Spine

3.4.1 Demonstrate proficiency in the posterior approach to the lumbar spine.

3.4.2 Demonstrate proficiency in performing posterior lumbar discectomies and multi-level decompressions.

3.4.3 Demonstrate proficiency in the placement of lumbar pedicle screws.

Reviewed and Approved by RPC
January 19, 2021