

Neurosurgery (Elective)

Length: 4 weeks of PGY-1 (Orthopaedic Designated Residents) or
4 weeks of PGY-2 or PGY-3 year
Location: The Queen ' s Medical Center
Primary Supervisor: William Obana, M.D.
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Despite the trend towards greater specialization in surgery, patients with underlying neurosurgical injury or illnesses are often seen and evaluated first by the general surgeon. In remote areas, general surgeons provide initial neurosurgical care because consultants are available only by phone, with medical center and direct neurosurgical support hours away. Failure to recognize central nervous system pathology in a patient with multi-system disease/trauma will often result in substantial mortality and irreversible morbidity. It is essential that the general surgeon be familiar with basic neurologic assessment and has an understanding of common disease entities and diagnostic imaging modalities to provide optimal and timely care of the patient with illness involving the nervous system.

Goals

Upon completion of the Neurosurgery rotation, the Resident will have the training and experience to enable them to recognize, stabilize, and initiate proper treatment of head and spine injuries as a result of trauma.

Additionally, the Resident will have an understanding of the relevant anatomy and physiology of the central, peripheral, and autonomic nervous system and their supporting elements. Residents will obtain the training necessary to recognize conditions which require referral to a Neurosurgeon on an emergent, urgent, and routine basis.

Objectives

At the end of this rotation, the resident will be able to:

Medical Knowledge

1. Demonstrate general knowledge of the anatomy, physiology, and pathophysiology of the central, peripheral, and autonomic nervous system.
2. Understand factors influencing cerebral blood flow.
3. Understand intracranial compliance and intracranial pressure.
4. Understand the concepts of primary and secondary brain injury.
5. Understand indications for and appropriate technique for placement of intracranial pressure monitor and/or ventriculostomy.

Patient Care

1. Demonstrate the ability to diagnose and manage disorders of the central nervous system that fall within the purview of general surgery.
2. Demonstrate the ability to evaluate and manage head and spine injuries.
3. Describe the components of a focused history and physical examination on patients with neurological or neurosurgical disease.
4. Discuss a differential diagnosis relating to the location and nature of the neuropathology.
5. Describe the characteristics of the various neuroradiologic procedures and the rationale for selecting them.
6. Outline the management of head injuries, to include:
 - a. selection, priority, and performance of resuscitation efforts
 - b. components and results of a baseline neurological examination to determine and evaluate change in the patient ' s neurological status (including the Glasgow Coma Scale)
 - c. clinical and radiographic diagnosis
 - d. treatment of scalp wounds, skull fractures, intracranial hemorrhage, and brain swelling
 - e. identification and selection of pharmacologic agents used to treat acute decompensation of the nervous system
 - f. significance of a dilated pupil
7. Outline the management of injuries of the cervical spine, including:
 - a. rationale for stabilizing the spine
 - b. description and interpretation of the neurological signs of a fracture/dislocation at various levels in the cervical spine
 - c. pathophysiological changes in a spinal cord injured patient.
8. Describe the pre- and postoperative management of the neurosurgical patient.

Professionalism

1. Interact with patients and their families in a respectful, sensitive, and ethical manner.
2. Interact with other members of the Neurosurgical Team and ambulatory clinic personnel in a respectful, responsible, and professional manner.

Systems-based Practice

1. Understand the multidisciplinary role of the Neurosurgeon, Neurointensivists, Surgical Intensivists, Trauma Surgeons, Nurses, Physical Therapists, Occupational Therapists, Rehabilitation Specialists, Social Services, Case Managers, and the Operating Room Team in the provision of safe and high quality neurosurgical care.

Practice-based Learning and Improvement

1. Demonstrate ability to utilize scientific studies to provide high quality neurosurgical care.
2. Appropriately utilize Hospital information technology systems to manage patient care, and to access on-line medical information to deliver high quality care.

Interpersonal and Communication Skills

1. Demonstrate skill in effective information exchange with patients, their families, and other members of the Neurosurgical Team, in the trauma setting and for elective procedures.
2. Demonstrate ability for accurate and timely information exchange between other members of the healthcare team, both verbally and in writing, with appropriate use of the medical record.

Implementation

The 4 week Neurosurgery elective will take place at The Queen's Medical Center under the preceptorship of Dr. William Obana, and will also include the following faculty: Drs. Calvin Kam, Michon Morita, Jon Graham, Leon Liem, Todd Thompson, and Daniel Donovan. The Resident is to report to Dr. Obana on the first day of the rotation. The following will be covered during the rotation:

1. Anatomy of the central nervous system and its associated structures.
2. Diagnostic studies:
 - a. plain films of the spine
 - b. computed tomography
 - c. cerebral angiography
 - d. magnetic resonance imaging (MRI).
3. Intracranial tumors.
4. Spontaneous intracranial hemorrhage.
5. Head and spine injuries.
6. Intracranial infection.
7. Spinal tumors.
8. Lumbar and cervical disc disease.

The clinical activities during the Neurosurgery rotation will include:

1. Performing detailed neurological examinations of patients in all states of consciousness.
2. Writing admission, diagnostic, and preoperative orders as directed by the Attending Faculty Neurosurgeon.
3. Reviewing all preoperative diagnostic studies with the Attending Faculty Neurosurgeon.
4. Becoming familiar with the modalities available for the diagnosis of neurosurgical disease, including plain x-rays, MRI, CT, and angiography.
5. Interpreting the results of neuroradiological procedures under supervision.
6. Participating in neurosurgical procedures and learning the skills used, including:
 - a. bone work (craniotomy)
 - b. hemostasis
 - c. protection of neural tissue
 - d. removal of specific lesions
 - e. management of problems related to CSF circulation

- f. repair of dura and bone
- 7. Performing limited neurosurgical procedures under direction, such as:
 - a. diagnostic lumbar puncture
 - b. burr hole
 - c. closure of scalp
 - d. elevation of simple depressed skull fracture
 - e. application and management of skeletal traction by tongs or halo
- 8. Managing postoperative neurosurgical patients.
- 9. Becoming familiar with post-hospital neurosurgical care.

Required Readings

In order to maximize the resident's learning experience during the Neurosurgery rotation, Dr. Obana and his colleagues will assign pertinent chapters from:

Greenberg, MS., ed., 2006: *Handbook of Neurosurgery*

The textbook will be issued by the Residency Program for loan during a Resident's Neurosurgery elective.

Residents will also be expected to supplement their textbook reading with current peer reviewed articles.