HEALTH TECH ACADEMY

Neurosurgery

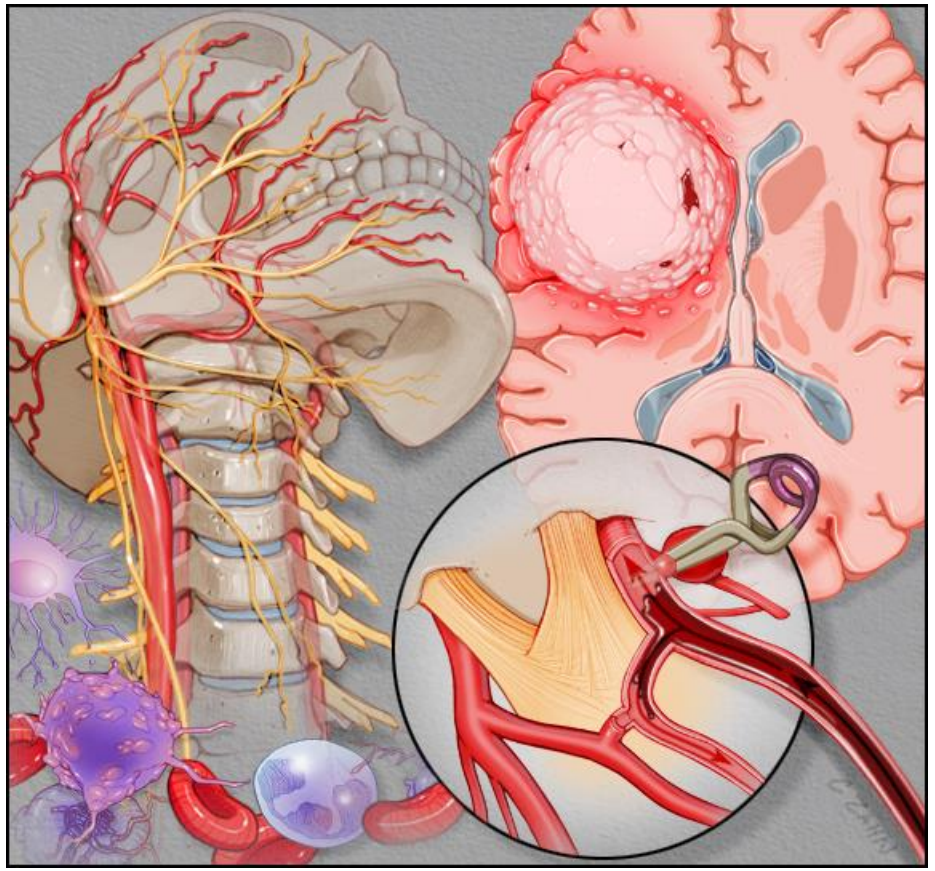
Additional Surgical Techniques

Lesson Objectives:

1. Identify key anatomical features of the nervous system
2. Describe the basic physiology of the autonomic nervous system
3. Describe basic diagnostic procedures of the nervous system
4. List and describe common surgical procedures of the nervous system

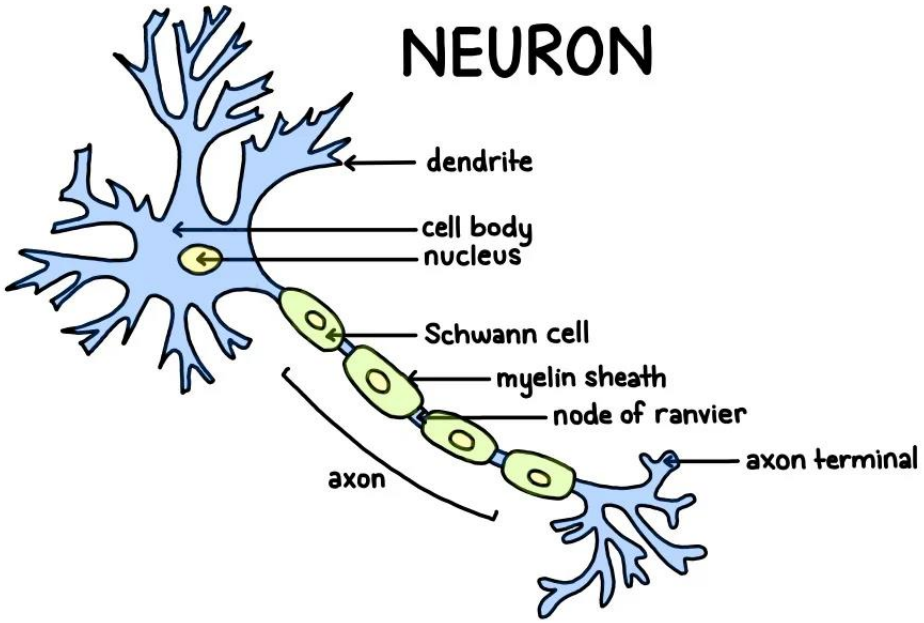
Neurosurgery

- Highly specialized field that focuses on
  - Treatment of disease of the brain
  - Functional disorders of the brain
  - Treatment of the spine
  - Treatment of the peripheral nerves



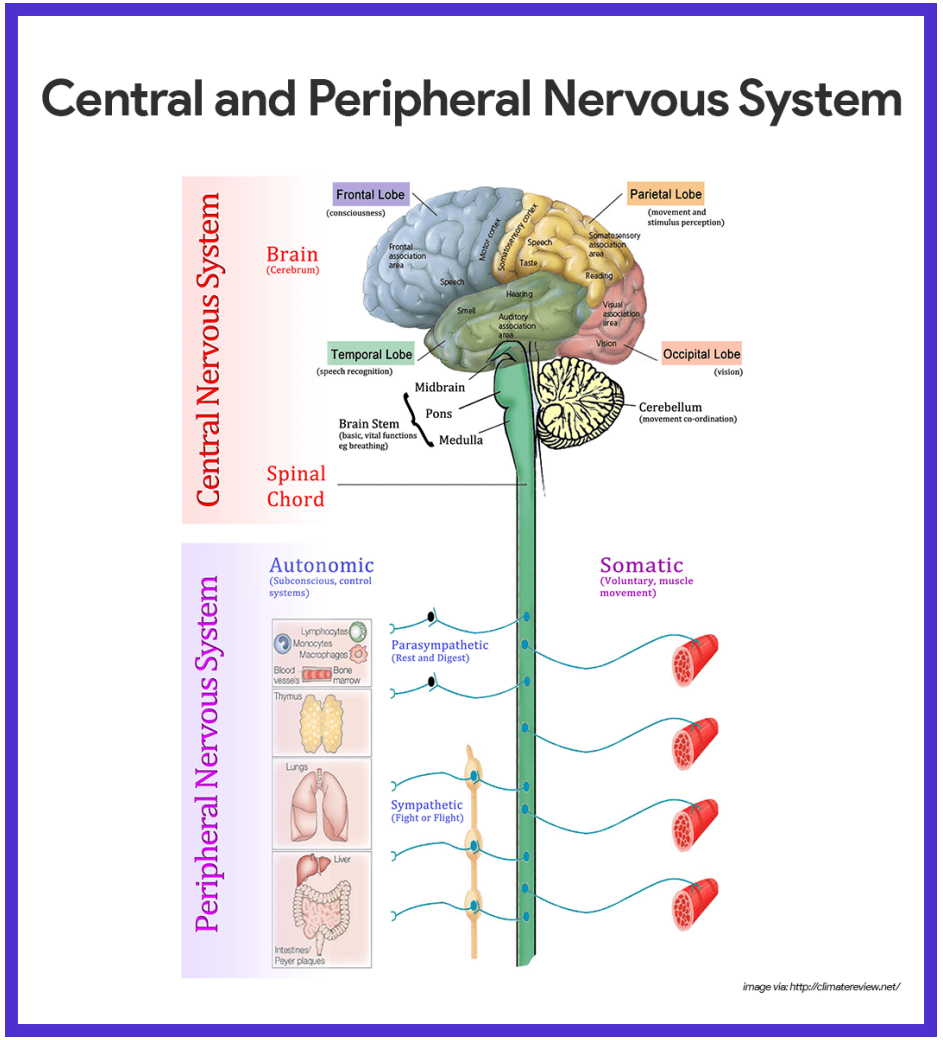
Cells of the Nervous System

- Neurons
  - Soma
  - Axon
  - Dendrites
- Neuroglia and Schwann cells



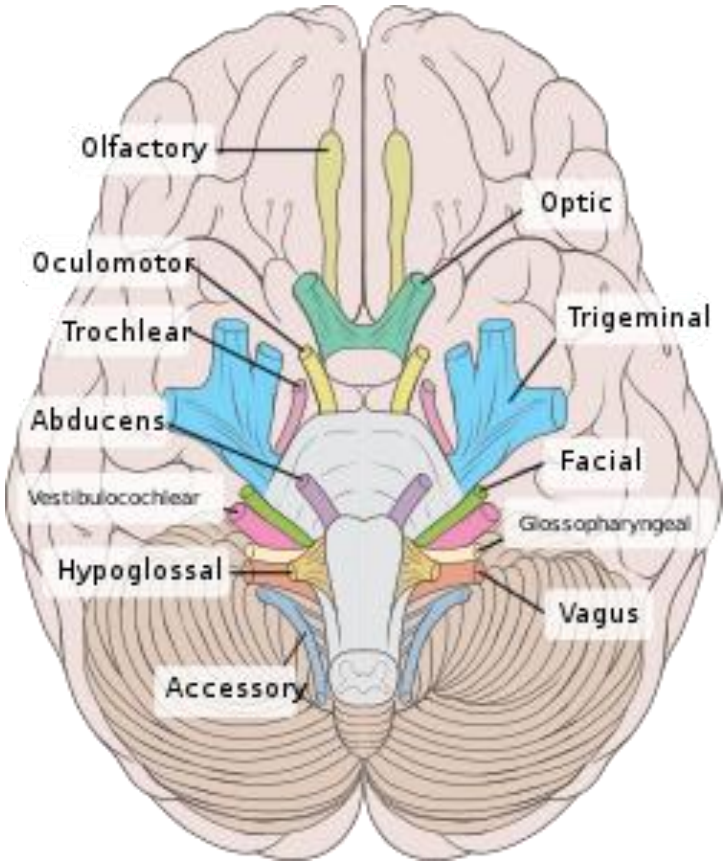
Anatomy of the Nervous System

- **Brain**
  - Forebrain
  - Midbrain
  - Hindbrain
- **Spinal cord**
  - Begins at the foramen magnum
  - Ends at the cauda equina (first and second lumbar vertebrae)



Cranial Nerves

- I (olfactory): Responsible for the sense of smell
- II (optic): Conveys impulses for sight
- III (oculomotor): Controls muscles that move the eye and iris
- IV (trochlear): Controls the oblique muscle of the eye
- V (trigeminal): A sensory nerve that controls the sensations of the face, forehead, mouth, nose, and top of the head
- VI (abducens): Controls lateral movement of the eye
- VII (facial): A motor nerve that controls the muscles in the face and scalp, as well as tears and salivation



Cranial Nerves

- VIII (vestibulocochlear [acoustic]): Controls hearing and equilibrium
- IX (glossopharyngeal): Controls the sense of taste and pharyngeal movement, as well as the parotid gland and salivation
- X (vagus): Innervates the pharyngeal and laryngeal muscles, heart, pancreas, lungs, and digestive systems; also controls the sensory paths of the abdominal viscera, the pleura, and the thoracic viscera
- XI (accessory): Has two parts, a cranial portion and a spinal portion. The cranial portion joins the vagus nerve to help control the pharyngeal and laryngeal muscles. The spinal portion controls the trapezius and sternocleidomastoid muscles.
- XII (hypoglossal): Innervates the muscles of the tongue

Autonomic Nervous System

- Involuntary system that transmits signals for vital functions such as:
  - Heart rate
  - Respiration
  - Digestion
- Connects the central nervous system (CNS) to viscera via the cranial and spinal nerves

Somatic Nervous System

- Connects the CNS to the skin and the skeletal muscles via the cranial and spinal nerves
- Keeps the body in touch with its surroundings

Watch the "Divisions of the Nervous System" Video

Divisions of the Nervous System Video

Click Here to watch the video

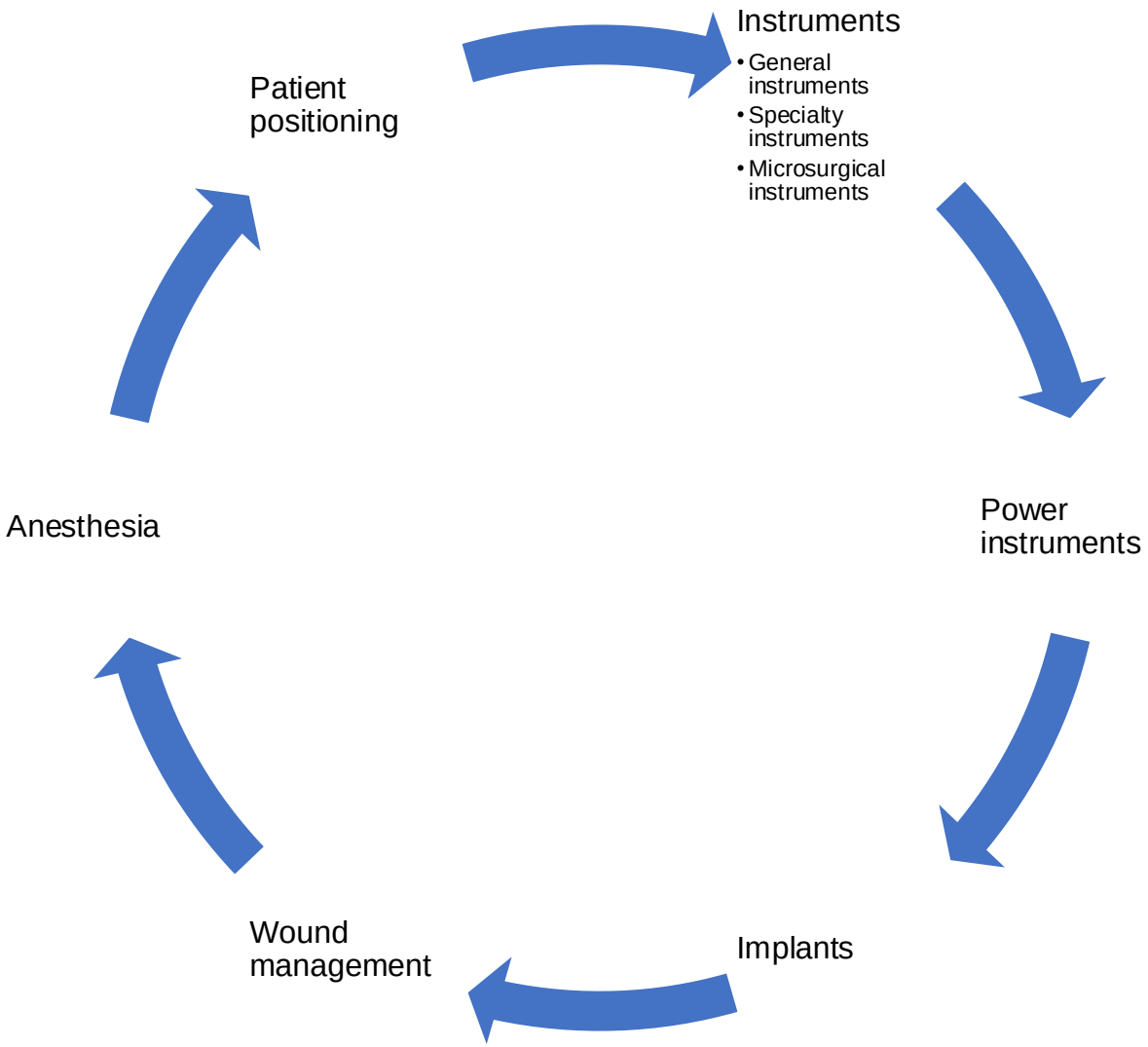
Divisions of the Nervous System Video

- **Summary of Video:**
  - Central Nervous System (CNS)
  - Peripheral Nervous System
  - Autonomic v Somatic Nervous System
  - Sympathetic v Parasympathetic Nervous System

Diagnostic Procedures

- History and physical
- Imaging studies
  - Computed tomography (CT)
  - Magnetic resonance imaging (MRI)
  - Functional MRI (fMRI)
  - Stereotactic MRI
  - Angiography
  - Magnetic resonance angiography (MRA)
  - Digital subtraction angiography (DSA)
  - Three-dimensional CT
  - Myelography
  - Discography
  - Ultrasound

Case Planning



Instruments

- Cranial:
  - Basic craniotomy or neurological set
  - Power instrumentation
  - Microsurgical instruments
  - Cranial plates & screws

Instruments

- Spinal
  - Basic laminectomy or neurological set
  - Anterior cervical discectomy
  - Specialty instrumentation
- Peripheral
  - Minor or plastic set

Routine Equipment

- Gardner-Wells or Mayfield pin fixation device 24-11
- Mayfield “horseshoe” headrest
- Wilson frame or Andrews table
- Operating microscope
- Nd:YAG or CO_2 laser
- Operative ultrasound machine
- Cavitron ultrasonic aspirator

Example of Wilson Frame with and without patient

Routine Equipment

- Heating and cooling unit and temperature monitoring devices
- Bipolar and monopolar electrosurgical units
- Nitrogen source for power equipment
- Mayfield overhead table
- Headlight and fiberoptic light source
- C-arm and monitor
- Fluid warming units and Cell Saver autotransfusion machine

Cranial Procedures

- Craniotomy
- Cerebral aneurysm surgery
- Arteriovenous malformation resection
- Endoscopically assisted correction of craniosynostosis
- Cranioplasty
- Ventriculoperitoneal shunt
- Transnasal transsphenoidal (TNTS) hypophysectomy
- Endoscopic third ventriculoscopy
- Stereotactic surgery

Watch the "Craniotomy Brain Aneurysm" Video

Craniotomy Brain Aneurysm Video

Click here to watch the video

Craniotomy Brain Aneurysm Video

- Summary of Video:
  - Scalp Incision – Clipping of Hair
  - Exposure of Skull – Drill into skull and remove skull flap
  - Lining of Brain (Dura) Dissection
  - Identification of Brain Tissue, Blood Vessels
  - Clip of Anuerysm
  - Closure

Electrical and Neurotransmission Studies

- Electroencephalogram (EEG)
- Electromyography (EMG)
- Somatosensory evoked potentials (SSEP)

Watch the "EEG" Video

EEG Video

EEG Video

Summary of Video:

- Used to Measure brain activity during an event
- Can be used for diagnosis

Spinal Procedures

- Anterior cervical discectomy and fusion (open)
- Anterior endoscopic cervical decompression of disc and foramen
- Posterior cervical laminectomy
- Thoracic corpectomy
- Posterior lumbar interbody fusion (PLIF)
- Minimally invasive lumbar discectomy
- Rhizotomy

Watch the "Neuro Spine Surgery" Video

Neuro Spine Surgery Video

Neuro Spine Surgery Video

Summary of Video:

- Bone is very vascular and can bleed
- Bone Mill – Grind up bone to be used as implant – allows bone to heal
- Plates and Screws for spinal fusion
- Within Millimeters of spinal cord – precision is important

Peripheral Nerve Procedures

Ulnar nerve transposition

Carpal tunnel release

Peripheral nerve resection and repair

Read Chapter 34 from the E-book

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Thank you!

Get ready for your quiz and rest of the activities now. Best of luck!

Congratulations!

Lesson 34 is complete.