Introduction to Neurosurgical Subspecialties:

Spine Neurosurgery

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Spine Neurosurgery

- Spine neurosurgeons treat patients with:
  - Degenerative spine disorders
    - Herniated discs
    - Spinal stenosis
    - Spondylosis
    - Spondylolisthesis
  - Spine fractures
  - Tumors of the spine
  - Deformity and scoliosis
Spine Neurosurgery

- Both neurosurgeons and orthopedic surgeons can specialize in spine surgery
- Fellowship not required for neurosurgeons, but some neurosurgeons opt for specialized training via complex spine fellowship
Spine Neurosurgery

Case Illustration #1

50 yo woman with progressive chin-on-chest deformity and presenting with cervical myelopathy
Spine Neurosurgery
Case Illustration #1

Pre-traction  Post-traction  Cervical 360 Reconstruction

THE SOCIETY OF NEUROLOGICAL SURGEONS
21 yo female with cervical chordoma with progressive pathologic fracture and myelopathy. Tumor encircling bilateral vertebral arteries. Passed preoperative balloon test occlusion of vertebral arteries.
Spine Neurosurgery
Case Illustration #2

Staged posterior - anterior tumor resection and cervical 360 reconstruction.
Stage 1: posterior tumor removal and stabilization
Stage 2: multilevel anterior corpectomy and reconstruction
28 yo female presents with history of scoliosis and back pain.
40 yo fell from a height. L1 and L4 burst fractures. Standing upright with a brace resulted in kyphosis and leg numbness consistent with acute instability.
Minimally invasive, percutaneous stabilization across both fractures

Guidewire insertion
Cannulated screw placement
Percutaneous connecting rod placement

Closure of 8 x 1 cm incisions
Spine Neurosurgery
Case Illustration #4

>4 months postop shows healing of both fractures. Screw and rods removed.
Peripheral Nerve Neurosurgery

• Peripheral nerve neurosurgeons treat patients with:
  • Carpal tunnel syndrome
  • Ulnar nerve entrapment
  • Brachial plexus injury
  • Other peripheral nerve injuries
Peripheral Nerve Neurosurgery

- Neurosurgeons, orthopedic surgeons, and plastic surgeons specialize in peripheral nerve surgery.
- Fellowship for peripheral nerve neurosurgery is not required but some may opt for specialized training via fellowship.
Carpal Tunnel Syndrome

- Most common peripheral nerve entrapment neuropathy
- Compression of the median nerve at the level of the wrist (flexor retinaculum)
- Nocturnal symptoms of having to “shake out hands”; sensory loss in palmar aspect of
Carpal Tunnel Syndrome
Cubital Tunnel Syndrome

• Second most common peripheral nerve entrapment neuropathy
• 4th and 5th digit numbness and hand weakness
• McGowan classification
  • Grade 1 – Minimal; parasthesias and numbness present, but no weakness
  • Grade 2 – Intermediate; wasting of interosseous muscles
  • Grade 3 – Severe; complete intrinsic paralysis
Cubital Tunnel Syndrome
Nerve Transfers

• Utilize redundant or less critical nerve function to reinnervate more critical denervated/injured target muscles

• Transform proximal injuries to a more distal injury by placing regenerating axons closer to the denervated motor endplates
Nerve Transfers

• Most common nerve transfers
  • Elbow-flexion
    • Oberlin procedure (ulnar fascicle to biceps) or double fascicular transfer (median/ulnar fascicle to biceps and brachialis)
  • Shoulder abduction
    • Triceps to axillary and spinal accessory to supraspinatus
Triceps to Axillary
Conclusions

- Surgery of the spine plays a large role in the field of neurosurgery
- Even within the subspecialty of spinal surgery, there are several further subspecialties, including trauma, degenerative spine disease, and spinal oncology
- Peripheral nerve surgery is a relatively smaller subspecialty but can provide pain relief and improved function for many patients