1) Cervical Spine - Dr. Hamid

Cervical Spine Anatomy

- Vertebrae (7)
- Intervertebral discs (6)
- Pairs of exiting nerve roots (8)
- Cervical lordosis Occ-C7 averages 40°
- Most of the lordosis occurs at the C1-C2 segment
- Approximately 50% of flexion-extension motion occurs at occiput-C1
- Approximately 50% of rotation occurs at C1-C2
- Lesser amounts of flexion-extension, rotation, & lateral bending occur segmentally between C2-C7

Atypical vertebral structure C1 (atlas)

- Vertebral canal/foramen
- Anterior arch
- Anterior tubercle
- Transverse process
- Posterior arch
- Transverse foramen
- Lateral mass

Atypical cervical vertebra C2 (axis)

- Odontoid process or dens
- Vertebral canal/foramen
- Facet joints
- Transverse process
- Transverse foramen
- Bifid spinous process
- Lamina

The odontoid process of the axis (C2) extends cranially to form the axis of rotation with atlas (C1)

Ligaments

- Anterior longitudinal ligament
- Posterior longitudinal ligament
- Ligamentum flavum
- Intertransverse ligaments
- Interspinous ligaments
- Ligamentum nuchae

Neural elements

- 8 pair of cervical nerves
- Exit the spinal canal superior to the vertebrae for which they are numbered
- C1 nerves exit the canal between Occ & C1
- C2 nerves exit the canal between C1 & C2
- C8 nerves exit the canal between C7 & T1
Torticollis

Infantile (congenital) torticollis

- Common. The sternomastoid muscle on one side is fibrous and fails to elongate as the child grows; consequently, progressive deformity develops.
- The cause is unknown; the muscle may have suffered ischaemia from a distorted position in utero (breech presentation and hip dysplasia), or it may have been injured at birth.

Clinical feature

- Hx-difficult labour or breech delivery
- O/E - lump - there is neither deformity nor obvious limitation of movement - months the lump disappear --
- Deformity does not become apparent until the child is 1–2 years old. The head is tilted to one side, so that the ear approaches the shoulder; the
- Sternomastoid on that side may feel tight and hard.
- There may also be asymmetrical development of the face (plagiocephaly). become increasingly obvious as the child grows.

DDx

- lymphadenitis
- bony anomalies
- discitis
- X-RAY

Treatment

- If the diagnosis is made during infancy-daily muscle stretching by the aparents may prevent the deformity.
- If the condition persists beyond one year, operative correction is required -usually at its lower end but sometimes at the upper end or at both ends) and the head is manipulated into the neutral position. After operation, correction must be maintained, with a temporary rigid orthosis followed by stretching exercises.

Secondary torticollis

- Infection (lymphadenitis, retropharyngeal abscess, tonsillitis, discitis, tuberculosis), trauma, juvenile rheumatoid arthritis, posterior fossa tumours, intraspinal tumours, dystonia (benign paroxysmal torticollis) or ocular dysfunction.

Cervical disc degeneration

- Cervical disc prolapse
- CERVICAL SPONDYLOSIS
- Cervical spondolytic myelopathy
- ossification of posterior longitudinal ligament
- cervical spinal canal stenosis

Intervertebral Disc

- Hydrostatic, load bearing structure between the vertebral bodies
- Nucleus pulposus + annulus fibrosus
- No blood supply
- L4-5, largest avascular structure in the body
Nucleus Pulposus
- Type II collagen strand + hydrophilic proteoglycan
- Water content 70 ~ 90%
- Confine fluid within the annulus
- Convert load into tensile strain on the annular fibers and vertebral end-plate

Annulus Fibrosus
- Outer boundary of the disc
- More than 60 distinct, concentric layer of overlapping lamellae of type I collagen
- Helicoid pattern
- Resist tensile, torsional, and radial stress
- Attached to the cartilaginous and bony end-plate at the periphery of the vertebra

Vertebral End-Plate
- Cartilaginous and osseous component
- Nutritional support for the nucleus
- Passive diffusion

Facet Joint
- Synovial joint
- Rich innervation with sensory nerve fiber
- Same pathologic process as other large synovial joint
- Load share 18% of the lumbar spine

Vital Functions
- Restricted intervertebral joint motion
- Contribution to stability and Preservation of anatomic relationship
- Resistance to axial, rotational, and bending load

Nerve root
- Medial & inferior to the pedicle at each level
- More susceptible for mechanical deformation

Cervical Disc Prolapse

Introduction
- Male predominance
- 30 – 50 yrs
- Smokers
- Sudden flexion & Twisting

Intervertebral Disc - Cellular and Biochemical Change
- Decrease proteoglycan content
- Water loss within the nucleus pulposus
- Decrease hydrostatic property
- Loss of disc height
- Uneven stress distribution on the annulus
Classification

A. Site: 5-6, 6-7
B. Direction: posterolat
C. Amount
   a. Bulge
   b. Herniation
      1. Protrusion
      2. Extrusion
      3. Sequestration

Clinical picture

- Pressure on PLL
- ---------- Dura
- Pressure on root
- Pressure on cord
- Mixed

Exam

- Look
- Feel
- Move
- Neurological Exam
- Special Test
  o Neck Compression, Distraction, Valsava

Imaging

- X-ray
- MRI
- CT scans with or without myelography
  o Intolerant to MRI
  o Unsuitable for MRI
- Gadolinium-enhanced MRI
  o This will help to delineate which part of the previous operation site is disc and which is epidural fibrosis (the latter enhancing).

DDx

- Acute muscular & ST strain
- Infection
- Tumor
- Rotator cuff syndrome
Treatment

- Usually have a good prognosis
- In up to four-fifths of patients, symptoms will resolve spontaneously within a 12-week period.
- However, if pain persists beyond this time there is a slow resolution of pain in the majority of patients.
- By approximately 4 years there is no difference in the incidence of pain in patients treated non-operatively or surgically.
- Surgical results will deteriorate after symptoms have been present for 1 year.
- REST-collar ANALGESICS & ANTI-INFLAMATORY
  - Reduce-traction
  - Remove
  - Rhablitate

Epidural steroid injection

- If pain persist beyond 4 weeks
- Maximum 3 injection per year

Indications for diskectomy

- Strong indications for surgical intervention
  - Acute mylopathy or myloradiculopathy
  - Progressive Neurological deficit
- Relative indications
  - Failure of conservative treatment-refractory
  - Significant motor deficit
  - Severe incapacitating pain - does not respond to any form of treatment

Surgical treatment

- Microdiscectomy
- Chemonucleolysis with Ozon, Chymopapain
- Automated Percutaneous Nucleotomy
- Manual Percutaneous Discectomy
- Percutaneous Laser Discectomy--
- Diskectomy plus fusion
- Diskectomy plus Vertebral arthroplasty