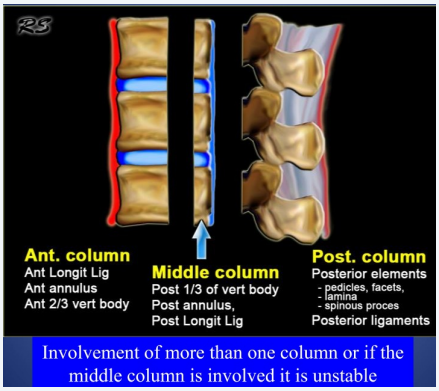
Cx f#

- More common at C1-2 & C5-6
- Flexion most common

Instabilty



Definition: Gross ligamentous damage with or without or potential for neurological insult/compromise

Hyperflexion injuries

Odontoid f# - mostly unstable

Wedge f# - Stable

Teardrop f# - severe and unstable

Bilateral locked facets - unstable

Spinous process f# - stable

Hyperextension injuries

- Hangmans f# - unstable
- Ext teardrop - can be stable/unstable
- Neural arch f# of C1 - stable

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Flexion Rotation

- Unilateral Locked Facets - stable

Vertical Compression

- Jefferson f# (comminuted f# of ring of C1) - unstable

- Burst f# (IVD driven into VB below) - stable

F# of the Atlas/C1

- **Posterior Arch** - Most common, hyperextension, most have other associated Cx F# and artery injury

- **Jefferson f#** - F# through anterior and posterior ring , lateral masses displaced laterally on APOM
If lateral mass displaced >8mm consider transverse ligament rupture
CT gold standard

Rupture of Transverse Ligament: Uncommon as an isolated incident - ADI (Down syndrome, RA)

Jefferson f#

L - APOM X-ray
R - CT of C1

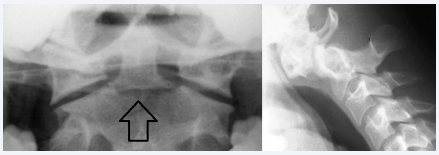
F# of Axis/C2

Den's F# - Common
Type 1: Avulsion of the tip
Type 2: F# at the base of the dens - most common
Type 3: F# deep within C2 body

Teardrop F#: Avulsion of anterior-inferior corner of C2 due to hyperextension

- **Hangman's f#** - Bilateral pedicle f# - some have another f# , usually at C1
Associated with artery injury + anterior translation of C2 on C3
Caused by hyperextension of the neck - rapid decelaration

Den's F#



L - Type 2 Den's f# (not through lateral masses)
R - Anterior translation of C2 on C3

Extension Teardrop F#

Hangman's f#

Compression f#

Wedge: Hyperflexion - stable

Flexion Tear Drop: Severely unstable

Burst: Vertical - posteriorly displaced fragments can cause cord damage (CT/MRI)

Osteoporosis Compression F#

- Axial loads + flexion

- Osteoclasts overtake osteoblasts - diminishes bone density

- **Classfication:**

Type I: Postmenopausal - women aged 51-65 oestrogen deficiency

Type II: Senile - both sexes after age 75 (women more affected)

Wedge

- Compression of vertebral body between adjacent bodes during flexion
- Vertical height is decreased anteriorly
- Posterior height maintained
- Usually at T10-L2 (if osteoporotic)

Flexion Teardrop

- Flexion + Axial compression
- Risk of spinal cord injury (MRI/CT)
- May be soft tissue swelling pre-vertebral area
- Posterior displacement and diastasis of the interfacetal joints = disruption of longitudinal + posterior ligaments, IVD,

Burst F#

Burst F# on X-ray (L) and CT (R)

- Posterior fragments can impinge upon spinal cord/neural canal

Clay Shoveller's f#

- Avulsion of SP of C6,C7,T1 - Stable
- Rotation of the upper trunk when Cx is fixed

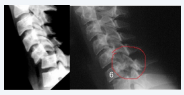
Dislocations

Atlanto-Occipital - Rare, usually fatal

Atlanto-axial - Anterior if transverse ligament ruptured

Facet Dislocation: Unilateral/bilateral

Facet Dislocation



- Bilaterally usually associated with some degree of neurological deficit
- Unilateral - flexion + rotation (opposite to the direction of rotation, SP points to the side of dislocation)
- Lateral projection - bow tie/butterfly appearance (ringed in red) - anterior displacement of dislocated VB a distance >one half sagittal diameter of a cx vb.
- Presents as painful torticollis with trauma

Signs of soft tissue injury

- Wide Retropharyngeal space (>7mm)
- Wide Retrotracheal Soft Tissue (>14-22mm)
- Tracheal Deviation
- Soft Tissue Emphysema

Tx Spine

Common f# areas: T11-T12

If T4-T8, suspect convulsions

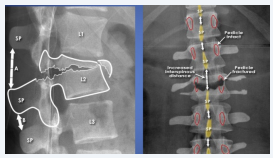
Tx compression F# (new)

New due to the preserved posterior VB height
- Anterior step defect present
-Line of condensation

- Old would have
- Wedge deformity (not as sticky outy)
-Intact cortex
- Normal trabeculation
On MRI
New f# will present increased signal on T2 and decreased signal on T1

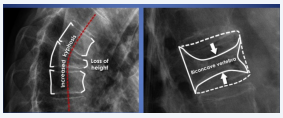
F# dislocation

Chance



Lap belt f#
Usually associated with severe organ damage

Osteoporosis



- Biconcave VB = codfish vertebra
- Thinning of cortices present
- DEXA screen (1-2.5 = osteopenia, >2,5 = osteoporosis)
- Tx spine pain can be red flag - other pathology (neoplasm, haemangioma, aneurymal bone cyst, multiple myeloma, sarcoma, mets) RULE OUT AGGRESSIVE CAUSES FIRST!

TVP F#

- Caused by avulsion - hyperextension and lateral flexion
- 2nd common f# in lx
- Most common in L2 and L3

Pathological Compression F#

- Decreased body height of the whole VB
- Consider Osteoporosis, Lytic metastasis or multiple myeloma
- Mets from prostate, kidney, breasts, lungs or skin (usually below T5)
- Look for signs of pathology - interpedicular widening, posterior VB involvement (pancake) - may need advanced imaging to conform as hard to tell

Risk Factors for osteo compr f#

- Osteoporosis (common in women and increases over time)
- Vertebroplasty/kyphoplasty
- Family Hx
- Low body weight
- Recent weight loss
- Smoking
- Sedentary Lifestyle/occupation
- Poor diet
- Inadequate Calcium/vitamin D intake

Risk Factors for osteo compr f# (cont)

- Excessive alcohol/caffeine intake
- Scoliosis
- Epidural steroid injections

Presentation for osteo com f#

- Fall on buttock/pain with arising from seated position, bending forward, coughing/sneezing
- Can be asymptomatic
- Aching/stabbing back pain
- Can radiate to ribs, hip, groin or buttocks
- Deconditioning, insomnia, depression, breathing difficulties from kyphosis
- Severe cases - spinal cord compression, transient ileus, urinary retention, paralysis
- On obs, increased tx kyphosis/loss of lx lordosis
- Patient feels as though they have lost height
- Fingertips extend to lower thigh when standing
- +ve Supine sign, +ve closed fist percussion
- Tenderness over site
- Limited ROM
- **REFER IMMEDIATELY IF CAUDA EQUINA S&S ARE THERE**

DDx

- Mets
- Osteomyelitis
- Pott disease (spinal TB)
- Hyperparathyroidism
- Paget's disease
- Spondylosis
- Spondylolysis
- Spondylolithesis
- Mechanical LBP
- Disc Lesion

DDx (cont)

- Viscerosomatic referral - GI/GU/cardiopulmonary systems

Management of os com f#

- Education about avoiding pain and maintaining mobility
- Bracing/lx corset
- Strengthening of spinal extensors
- Aerobic conditioning
- Proprioceptive/balance training
- 800-1000IU of vitamin D
- 1000-1200 of calcium
- Sunlight exposure 6-7 mins (summer) and 15-29 minutes in the winter per day
- **SMT contraindicated**
- Surgical intervention if con care fails (3-4 weeks)

Criteria for earlier surgery:
Progressive increase in f# angle (>10 degrees)
Persistent, progressive or debilitating pain

- Medications: Bisphosphonates (Fosamax, Didronal, Boniva, Actonel, Skelid, Aredia, Reclast, Zometa , Raloxifene (Evista), Denosumab {Prolia), hormones Calcitonin (Fortical or Miacalcin and Teriparatide (Forteo)