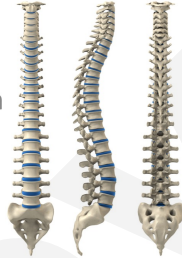


Some Random Spinal Surgery Stuff You Should Know For The MRCS



Mr M J H McCarthy
Consultant Spinal Surgeon



Overview

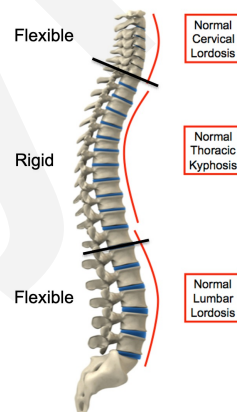
- Anatomy
- History
- Examination
- Radiology
- Low Back Pain
- Disc Prolapse / Cauda Equina Syndrome
- Stenosis / Spondylolisthesis
- Trauma / SCI
- Infection
- Tumour
- Scoliosis / Kyphosis



Spine Function - PMS

- Protection
- Movement
- Support

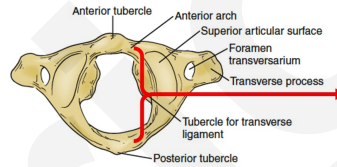
Biomechanics



- Anterior Column
 - 80% Load
 - Compression
- Posterior Column
 - 20% Load
 - Tension

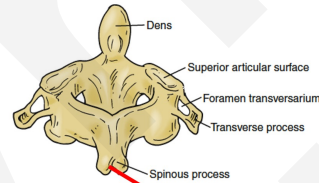
Cervical Anatomy

- 7 Bones 8 Nerves
- Typical
 - C3-6
 - Bifid spinous processes + foramen transversum
- Atypical
 - Atlas and Axis
 - C7 (vertebra prominens)
- Flexion / Extension / Lateral Bend / Rotation

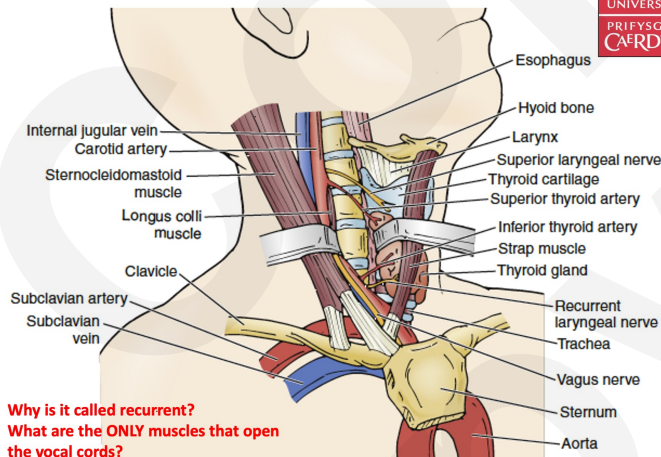
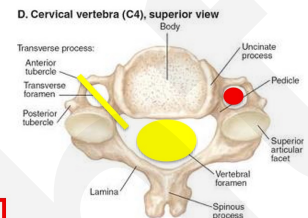


Steel's Rule of Thirds
1/3 Dens
1/3 Cord
1/3 Space

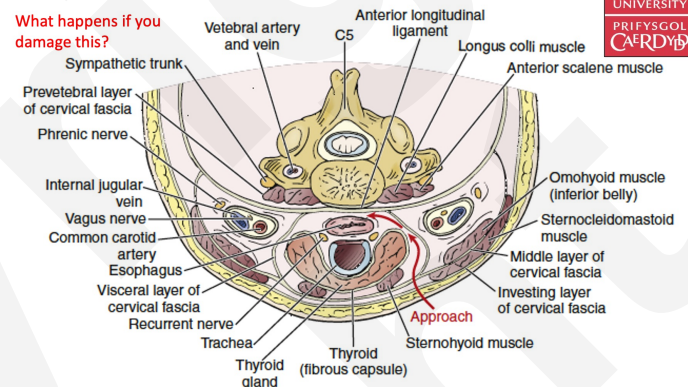
50% Cervical Movement Occurs at C0-2



Feel your own!



Why is it called recurrent?
What are the ONLY muscles that open the vocal cords?
Central line insertion landmarks?...



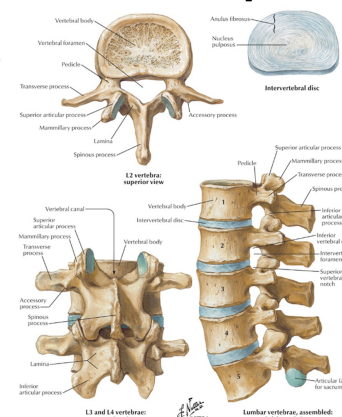
KNOW NORMAL TO UNDERSTAND PATHOLOGICAL, SURGERY, CENTRAL LINES, INTUBATION, LARYNGOSCOPY, BRONCHOSCOPY, ENDOSCOPY...

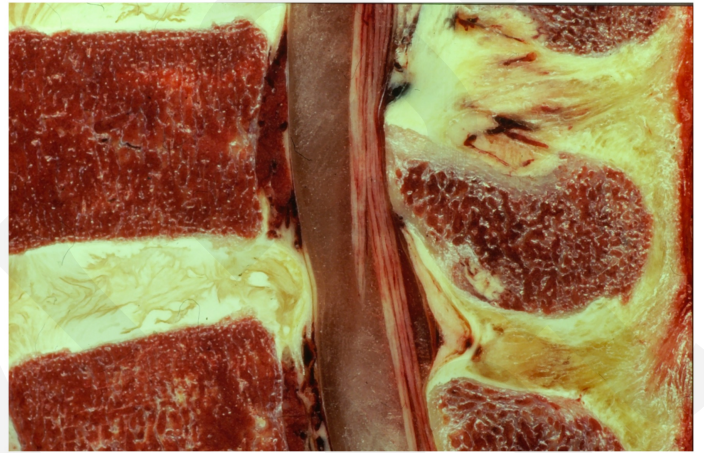
Thoracic Anatomy

- 12 Vertebrae
- Smaller than Lumbar
- Facets Frontally Orientated in A-P View
- Spinous Processes Longer, Distally Orientated
- Transition at Thoracolumbar Junction T9-12

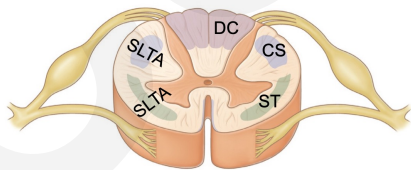
- Mostly rotation
- Why does the thoracic spine not move?...

Lumbar Spine





Spinal Cord



Pay Attention to The Detail



- Absolutely nothing substitutes a good history and clinical examination!

History

- SOCRATES
- Neurology – motor / sensory / bladder / bowel
- Deformity
- Red Flags

Red Flags

- <16yrs or >50yrs with NEW onset pain
- Unwell / unexplained weight loss / unexplained fevers
- Past history of cancer, recent serious illness, recent significant infection, previous long standing steroid use, HIV / AIDS, end stage renal disease, osteoporosis, Paget's disease, alcohol or drug abuse
- Widespread neurological deficits
- Pain is non-mechanical
- Thoracic pain
- Spinal deformity
- History of significant trauma / injury
- Fails to improve with treatment

Examination



- INSPECTION - PALPATION - PERCUSSION - AUSCULTATION
- LOOK - FEEL - MOVE - SPECIAL - TESTS
- INSPECTION - TONE - POWER – REFLEXES - SENSATION - COORDINATION
- GAIT

Spinal Examination



- LOOK
 - Assess for normal thoracic kyphosis and lumbar lordosis, presence of any spinal deformities, scoliosis, kyphosis, skin changes, scars
 - Head above pelvis from in front and from the side
- FEEL
 - Palpate for tenderness
 - Spinous processes, paraspinal muscles, sacroiliac joints (PSIS)

Spinal Examination



- MOVE
 - assess cervical and thoracolumbar spine movements actively (+/- then passively)
 - Flexion
 - Extension
 - Lateral bending
 - Left and right rotation
 - (Thoracic rotation done with pelvis secured)

Spinal Examination

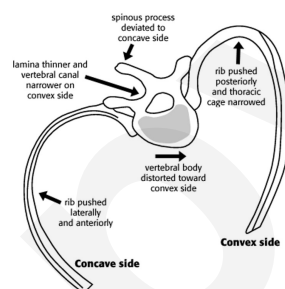


- SPECIAL TESTS
 - Perform Schobers test – measure the lumbar spine flexion
 - Perform Adams forward bending test to assess for any fixed spinal deformity
 - Assess straight leg raising (Lasègue's sign)
- **“...and I would perform a neurological exam...”**

Adams Test



Rib Hump



Neurological Examination



- INSPECTION
 - Posture, muscle fasciculation, contractures, scars, wasting etc.
- TONE
 - Assess muscle tone – gently move the limb passively – flaccidity / rigidity
- POWER
 - Assess power / strength (MRC grading out of 5)
 - Myotomes as per American Spinal Injury Association (ASIA)

Neurological Examination

- REFLEXES
 - Assess deep tendon reflexes
 - Hyper and hyporeflexia
 - Biceps / Brachioradialis / Triceps
 - Knee / Ankle
 - Assess plantar responses
 - +/- Assess for inverted radial reflex and Hoffmann's sign
 - +/- Assess for ankle clonus
 - +/- Superficial abdominal reflexes

Neurological Examination

- **SENSATION**
 - Dermatomes as per American Spinal Injury Association (ASIA)
 - Pain / temperature
 - Light touch / vibration / joint position sense
 - Assess for saddle anaesthesia and anal sphincter tone
- **COORDINATION**
 - Finger nose, hand dexterity, ankle knee shin
 - Gait and Rombergs test



INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY (ISNCSCI)



Examiner Name _____

Date of Exam _____

Signature _____

RIGHT

UER _____
(Upper Extremity Right)

Reflexes

1/2 _____

3/4 _____

5/6 _____

7/8 _____

LEF _____
(Lower Extremity Right)

MOTOR KEY MUSCLES

C2 _____

C3 _____

C4 _____

T2 _____

T3 _____

T4 _____

T5 _____

T6 _____

T7 _____

T8 _____

T9 _____

T10 _____

T11 _____

L1 _____

L2 _____

L3 _____

L4 _____

L5 _____

S1 _____

S2 _____

S3 _____

S4/S5 _____

RIGHT TOTALS

(MAXIMUM) (50) (50) (50)

SENSORY KEY SENSORY POINTS

Light Touch (LTP) Pin-Prick (PPR)

C2 _____

C3 _____

C4 _____

T2 _____

T3 _____

T4 _____

T5 _____

T6 _____

T7 _____

T8 _____

T9 _____

T10 _____

T11 _____

L1 _____

L2 _____

L3 _____

L4 _____

L5 _____

S1 _____

S2 _____

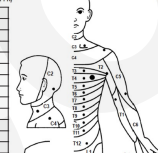
S3 _____

S4/S5 _____

SENSORY SUBSCORES

LER _____ LEL _____ LEWS TOTAL _____

(MAX) (50) (50) (150)



• Key Sensory Points

UPL _____
(Upper Extremity Left)

Reflexes

1/2 _____

3/4 _____

5/6 _____

7/8 _____

LEF _____
(Lower Extremity Left)

MOTOR KEY MUSCLES

C2 _____

C3 _____

C4 _____

T2 _____

T3 _____

T4 _____

T5 _____

T6 _____

T7 _____

T8 _____

T9 _____

T10 _____

T11 _____

L1 _____

L2 _____

L3 _____

L4 _____

L5 _____

S1 _____

S2 _____

S3 _____

S4/S5 _____

LEFT TOTALS

(MAXIMUM) (50) (50) (50)

NEUROLOGICAL LEVELS

Step 1 of the classification can be entered

1. SENSORY R L

2. MOTOR R L

3. NEUROLOGICAL LEVEL OF INJURY (NLI) R L

4. COMPLETE OR INCOMPLETE? Incomplete: All sensory or motor function is preserved below the neurologic level.

5. ASIA IMPAIRMENT SCALE (AIS) (in complete agreement with the NLI)

ZONE OF PARTIAL PRESERVATION

Step 2 of the classification can be entered

NEUROLOGICAL LEVEL R L

1. SENSORY R L

2. MOTOR R L

Muscle Function Grading		ASIA Impairment Scale (AIS)		Steps in Classification	
0 = total aparesis 1 = palpable or visible contraction 2 = active movement, LM against motor f-ICM with gravity eliminated 3 = active movement, LM ICM against gravity 4 = active movement, LM ICM against gravity and moderate resistance in a muscle specific position 5 = voluntary movement, LM ICM against gravity and moderate resistance in a muscle specific position		A = Complete. No sensory or motor function is preserved in the sacral segments S4-S5. B = Sensory incomplete. Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5 (light touch or pinprick at S4 or S5 or deep and pressure) AND motor function is preserved more than three levels below the motor level on either side of the body. C = Motor incomplete. Motor function is preserved below the neurological level, and more than five (5) muscle grades below the neurological level of injury (NLI). There is a muscle grade below than 3 (Grade 2). D = Motor incomplete. Motor function is preserved below the neurological level, and at least 6 (6) or more of all key muscle functions below the NLI. There is a muscle grade below than 3 (Grade 2). E = Normal. Normal motor function is preserved below the SENSORY and/or motor level in all segments, and the patient had prior deficits. Then AIS-E is 5. Someone without an injury AIS-E does not receive an AIS grade.		The following order is recommended for determining the classification of individuals with SCI. Determine sensory levels for right and left sides. Light touch is the most caudal, intact dermatome for pin prick and pinprick test sensation. Determine motor levels for right and left sides. Defined by the lowest key muscle grade in any level of a test (at least 2 pinprick) including the grade key muscle functions represented by segments above that level are judged to be intact (graded as 5). Note or ignore where there is no muscle test. If no muscle test is present to the level of the most caudal muscle grade, it is table and not presumed to be the same as the grade just above that level.	
NT* = normal active function, LM ICM against gravity and sufficient resistance to move a 5 lb weight, after a brief rest (10-15 sec). A 5 lb weight should be moved in a functional muscle position (most from an overhead/prone position). NT* = normal active function, LM ICM against gravity and sufficient resistance to move a 5 lb weight, after a brief rest (10-15 sec). A 5 lb weight should be moved in a functional muscle position (most from an overhead/prone position).		Determine the neurological level of injury (NLI) This refers to the most caudal segment of the body with a normal (graded sensory and/or motor function) preserved, provided that there is normal (graded sensory and/or motor function) below the NLI. And 1/3 or more the most caudal of the sensory and motor levels determined in all segments.		4. Determine whether the injury is Complete or Incomplete. a. Absence or presence of sacral sparing? <i>If sensory and/or motor – No AIS-E AIS 3 sensory scores = 0</i> <i>And absent and present = No, then AIS-E AIS 4 sensory scores = 0</i> Otherwise, injury is Incomplete.	
Not Key Muscle Functions (optional) Not key muscle functions are used to help assign a motor level in differentiated AIS B, C		5. Determine AIS Impairment Scale (AIS) Grade Is injury Complete? YES AIS-A can record 2/3 (lowest dermatome or myelome on each side with some preservation) NO Is injury Motor Complete? YES AIS-B NO (No-sensory and/or contraction 0/3 motor level more than three levels below the motor level than a given site). If the patient has sensory incomplete classification)		Are at least 6 (6) or more of the key muscles below the neurological level of injury graded to at least? YES NO YES NO AIS-C AIS-D	
Is sensory and/or motor function in any level in all segments, AIS-E? If normal sensory and/or motor function in any level in all segments, AIS-E is assigned – follow up below when an individual with a documented SCI has no sensory or motor function. If still injured (no deficits) but the individual is neurologically intact, the AIS-E Impairment Scale does not apply.		INTERNATIONAL STANDARDS FOR NEUROLOGICAL CLASSIFICATION OF SPINAL CORD INJURY		ASIA AMERICAN SPINAL INJURY SOCIETY ISCOR	

Exam Tips

- DO NOT FORGET TO FEEL FOR PULSES

- Don't overcomplicate things
- Exams are designed for you to pass
- Failing is not the end of the world so don't stress
- Do NOT panic
- Stick to the plan – do not deviate
- Use the third eye – be aware
- Breathe
- And finally don't wear bright pink socks

UMN vs LMN

Sign	UMN Above AHC	LMN In / Below AHC
Weakness	More diffuse	More focal
Atrophy	Mild general	Severe focal
Atrophy vs Weakness	Severe weakness Mild atrophy	Severe atrophy Mild weakness
Fasciculations	Never seen	+/-
Muscle Tone	Increased	Decreased
Muscle Stretch Reflexes	Increased	Decreased / Absent
Clonus	+/-	Never present
Plantar Response	+/-	Absent

Myelopathy Radiculopathy

	Myelopathy = CORD	Radiculopathy = ROOT
Levels affected	>1	Usually 1
Bilateral Symptoms	Common	Rare
Sensation	Variable	Decreased in Dermatome
Motor	Weakness	Weakness in Myotome
Tone	Spastic	Flaccid
Reflexes	Hyperreflexic	Hyporeflexic
Gait	Broad based Poor balance	Depends on level (e.g. foot drop with L4)
Findings	Babinski Clonus	Pain Dysaesthesia

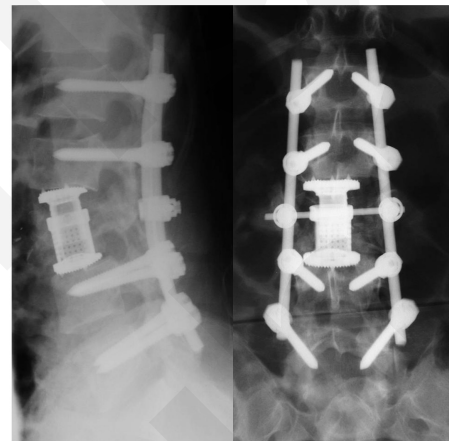
UMN

LMN

Orthopaedic Principles

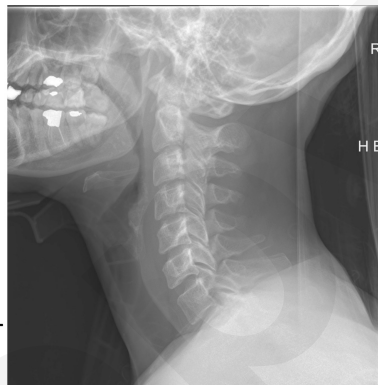


Get
Orthogonal
Views



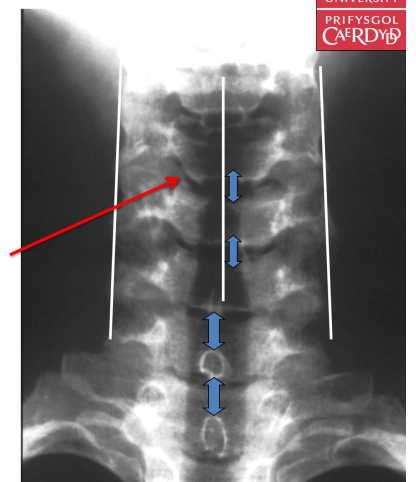
Lateral C Spine XR

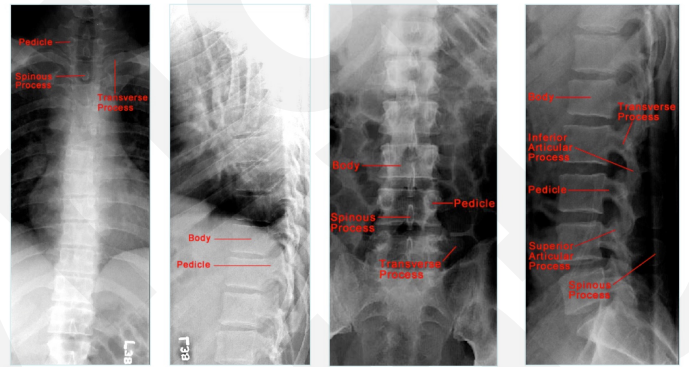
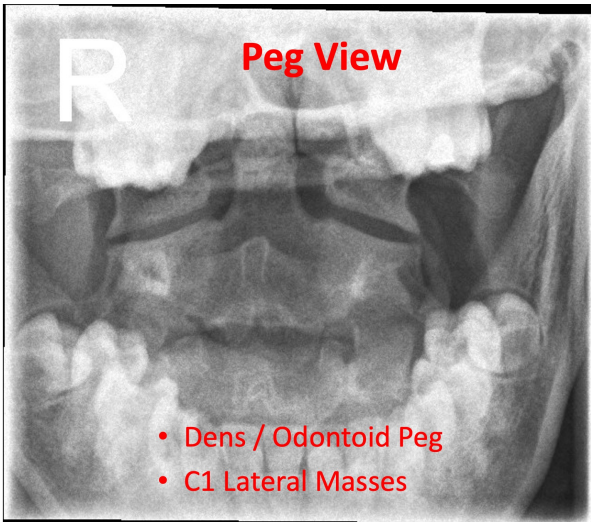
- Name / Age
- Date
- Type of Radiograph
- A : ADEQUACY
/ ALIGNMENT
- B : BONE
- C : CARTILAGE
- D : DENS
- E : EXTRAAXIAL SOFT
TISSUE



AP View

- Alignment
- Vertebral Bodies
- Lat Masses
- Joints of Luschka
- Sp Processes
- Discs

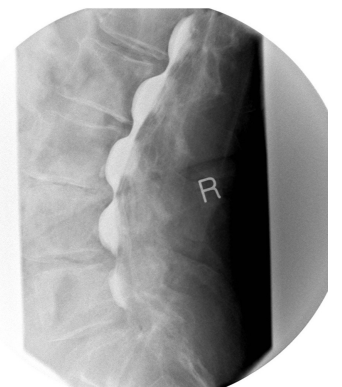
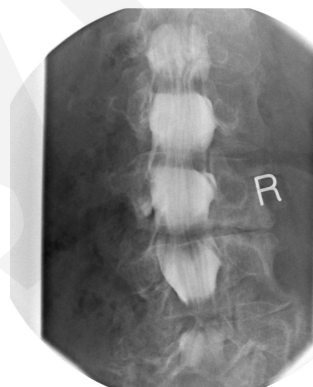




Disc



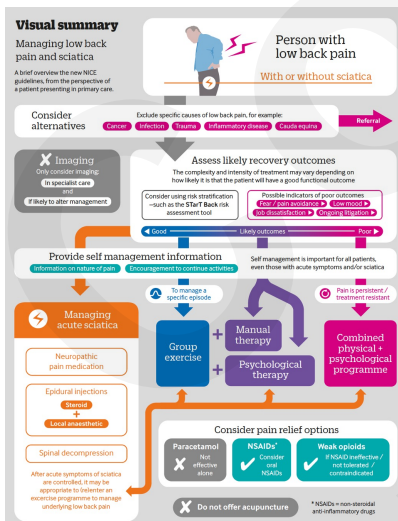
Bone





Main Causes of LBP

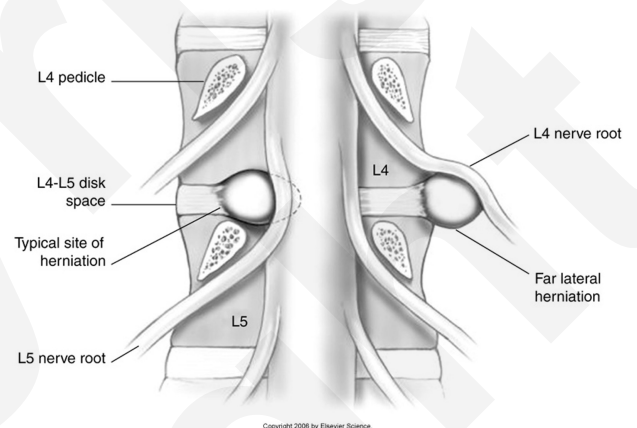
- Non-specific LBP / Mechanical / Muscular
- Degenerative Disc Disease / Discogenic
- Facet Joint Arthrosis
- Spondylolisthesis / Spondylolysis
- Degenerative Scoliosis / Kyphosis
- Inflammatory Conditions
- Sacroiliac Joint Pain
- **ATIT**



Low back pain and sciatica in over 16s: assessment and management

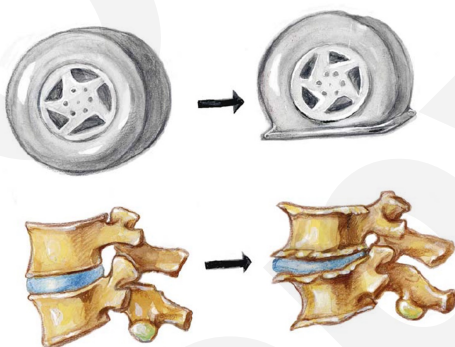
NICE guideline
Published: 30 November 2016
nice.org.uk/guidance/ng52

Disc Prolapse



Non Specific LBP (?)
Don't operate!

Degenerative Pathology



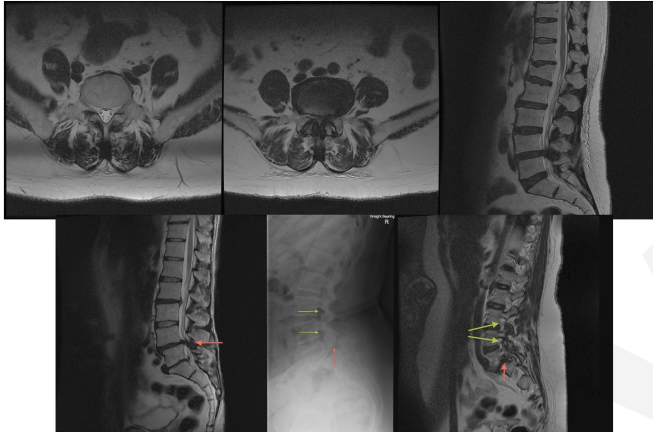
- Normal canal size in flexion vs extension?

Stenosis

- **Spinal Claudication**
 - Ppt stand and walk
 - Relief lean and sit
 - Prox to distal
 - Worse down hill
 - Better up hill
 - Unlimited cycling
 - Weakness on exertion
 - Shopping trolley +
 - May have poor pulses
- **Vascular Claudication**
 - Ppt walk
 - Relief stand
 - Distal to proximal
 - Worse up hill
 - Better down hill
 - Cycling - pain
 - Not normally weak
 - Trophic skin changes
 - Poor pulses...

Have your finger on the Pulse!

Stenosis Spondylolisthesis



Back Pain - Don't be **ATIT**

- Exclude the serious:-

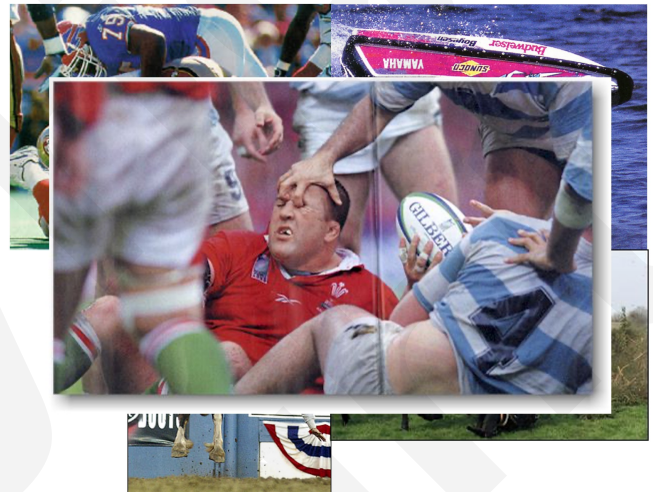
– **Abdominal** / Retroperitoneal Causes

- AAA, Pancreatitis, Malignancy

– Spinal **Trauma**

– Spinal **Infection**

– Spinal **Tumour** - Primary / Mets



Suspecting Spinal Injury

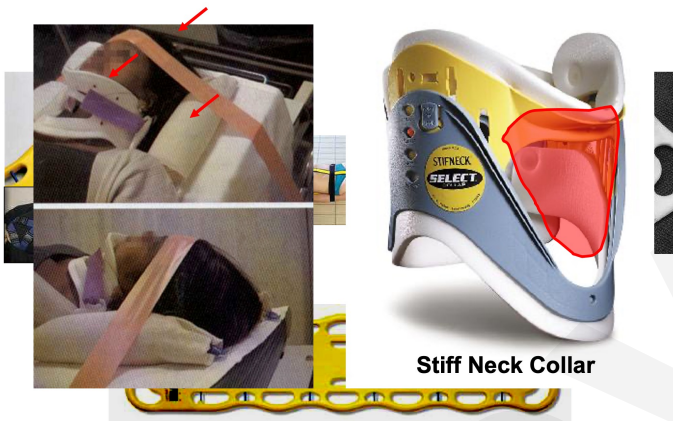
- Mechanism of Injury
- Unconscious
- Neurological Deficit
- Spinal Pain / Tenderness

Goals of Spine Trauma

- Protection
- Detection **ATLS**
- Optimize conditions for neuro recovery
- Maintain / restore spinal alignment
- Minimize loss of spinal mobility
- Obtain healed and stable spinal column
- Rehabilitation

- **#s = Manage the ass soft tissue injury**

Immobilise Entire Spine



Stiff Neck Collar

SCI Unconscious Patient

- Flaccid areflexia
- Diaphragmatic breathing
- Pain response above clavicle
- Bradycardia / /Hypotension
- Priapism



"Shock"

- Refers to a state of inadequate organ perfusion and tissue oxygenation
- Hypovolaemic – Haemorrhagic or fluid loss
- Tension Pneumothorax
- Cardiac Tamponade
- Cardiogenic
- Neurogenic
- Septic
- Anaphylactic

Pump Failure (incl Obstructive)
Circulatory Failure

Spinal "Shock"

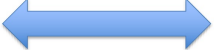
- Refers to the flacid paralysis, areflexia and lack of sensation secondary to physiologic spinal cord "shut down" in response to injury
- Usually resolves within 24 hours when reflex arcs caudal to injury return
- Lowest that can be tested clinically
 - bulbocavernosus reflex
- **Importance of spinal shock**
 - determining whether a patient has a complete or incomplete spinal cord injury

Neurogenic Shock

- State of inadequate tissue perfusion and oxygenation due to:
- Reduced sympathetic outflow (T1-L2) with resultant unopposed vagal tone
- Hypotension due to loss of blood vessel tone with resultant venous pooling
- Bradycardia due to reduced cardiac stimulation
 - distinguishes neurogenic shock from other types of shock (e.g. hypovolaemic, cardiac, anaphylactic)

Spinal Injury



Stable  Unstable

Clinical Instability



- The loss of the ability of the spine under **normal physiological loads** to maintain its pattern of displacement so that there is no initial or additional **neurological deficit**, no major **deformity** and no incapacitating **pain**

Spinal Injury Screening



- Clinically
 - Cooperative patient
 - Alert and orientated
 - Able to concentrate on spine
 - Normal neurological exam
 - No spinal pain or tenderness
 - No pain or tenderness with voluntary movement

Spinal Injury Screening



- Altered consciousness or symptoms
 - Radiological imaging required
 - Presume the spine is unstable
 - Protect

Spinal Injury Screening



- Lateral Cervical X-Ray
 - Detects 85% cervical fractures
- Image the entire spine
 - 10% with one fracture have another non contiguous injury

CT Indications



- Poly trauma – CT Head to Hips
- Plain Radiographs have failed to visualise all the cervical spine
 - Cervico-thoracic junction
 - Intubated patient (no odontoid peg view) – continue brain CT down to C3
- Plain Radiographs show injury
 - Confirm and further categorise extent of injury

MRI in Spinal Trauma



- Overview for exclusion of injury in difficult cases (ankylosing spondylitis)
- Ligamentous injury
- Unexplained neurology
- Prognosis in neurological injury
 - Compression vs oedema vs haemorrhage vs transection
- Is surgical fixation safe?
 - Extruded disc may be made worse by surgical manipulation /
 - Other discs ligaments may be injured



Consequences of SCI



- (Paralysed...)
- Inadequate ventilation
- Abdominal evaluation compromised
- Occult compartment syndrome

Management Spinal Injury



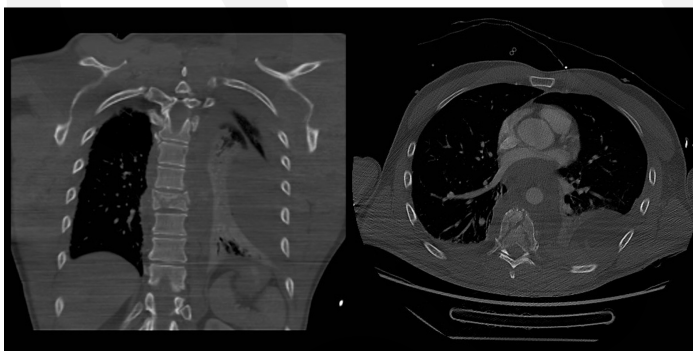
- Treat life threatening injuries first
- Ventilation and Oxygenation
- Maintain blood pressure
- Maintain spinal cord perfusion

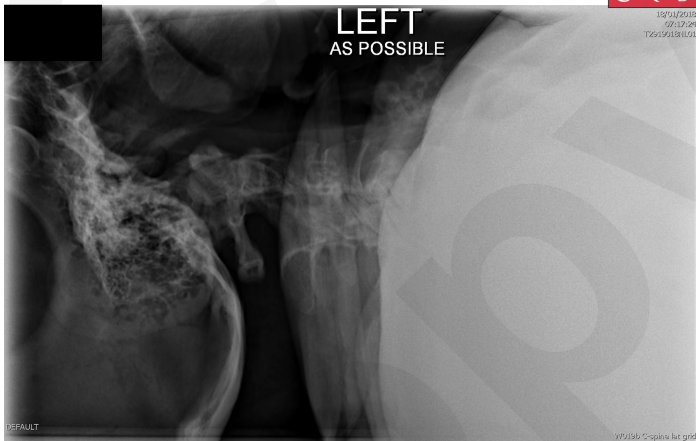
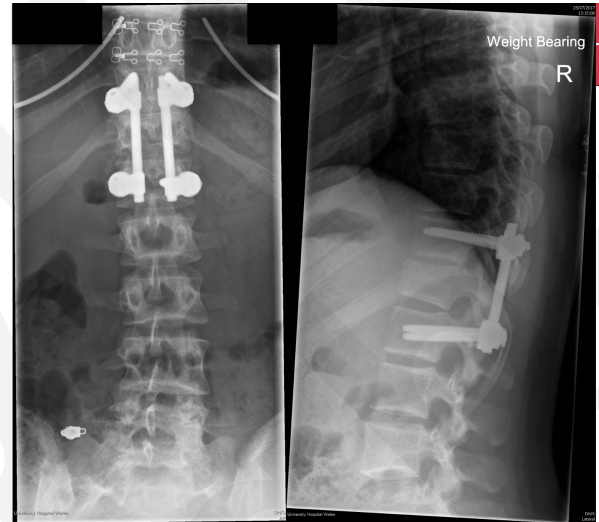
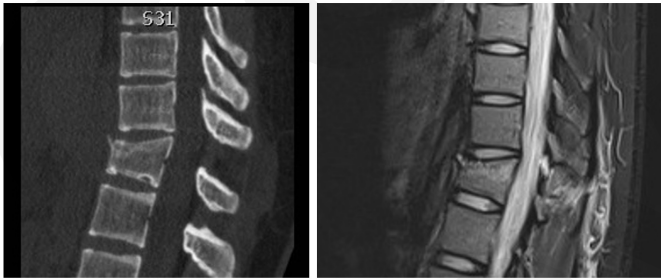
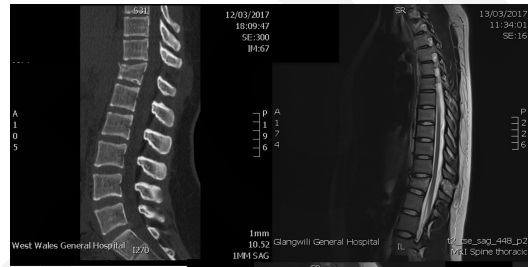
Management Hypotension



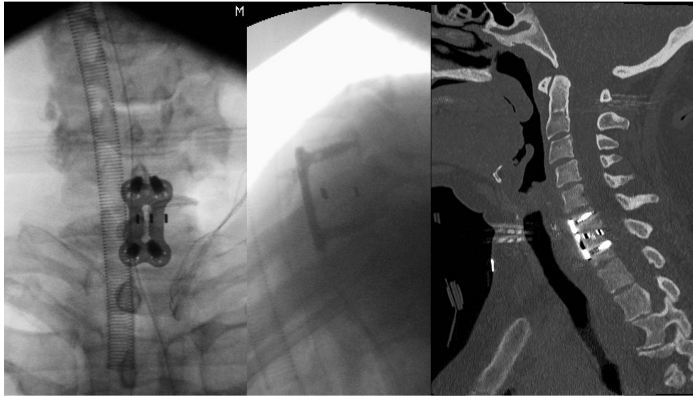
- In Major Trauma:
- Haemorrhagic shock until proven otherwise
- Consider neurogenic shock
- Monitor urine output

Hypotensive Bradycardic...





Pathophysiology SCI



- Transient Neurapraxia
- Oedema
- Haemorrhage
- Transection



Spinal Cord Injury

- Primary (at the time of injury)
- Secondary (occurring after the injury)
- **Complete spinal cord injury**
 - no sensation or voluntary motor function below the level of the injury
- It can only be confirmed **after the resolution of spinal shock** when reflex activity has returned
- The level of the injury is defined as the first with useful partial neurological function >3/5
- The overall prognosis for recovery of neurological function in complete lesions is poor

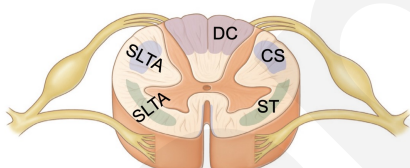
Spinal Cord Injury

- **Incomplete spinal cord injury means that there is some function caudal to the injury**
- In general, the greater the function the faster the recovery and better the prognosis
- Sacral sparing after spinal cord injury
 - the presence of sacral sensation, voluntary rectal tone and great toe movement
 - indicates intact long tract neurones and the potential for recovery
- Prognostic for predicting recovery except in lesions involving the conus medullaris or cauda equina

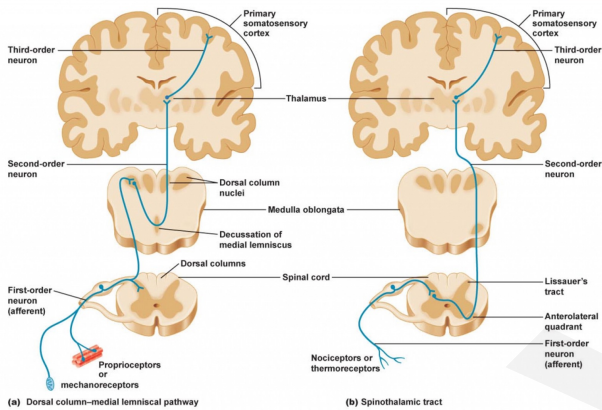
Cord Syndromes

- Anterior
- Posterior
- Central
- Brown-Sequard

ALL SPECIFIC FORMS OF INCOMPLETE SCI



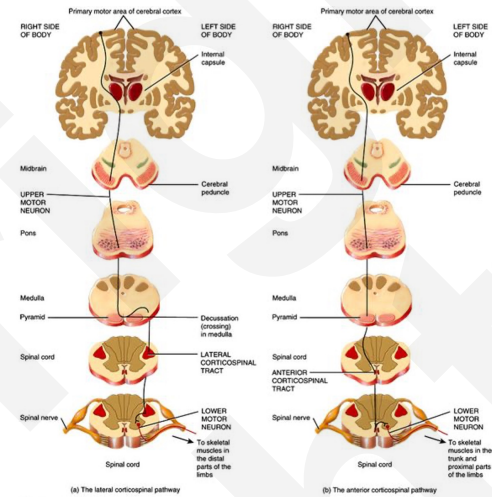
Pathway	Direction	Origin	Cross-over	Destination	Function
Corticospinal *	Descending	Motor cortex	90% as lateral CST; 10% as anterior CST	Alpha motor neurons	Skilled motor to extremities
Reticulospinal	Descending	Reticular formation	Variable levels	Alpha and gamma motor neurons	Cortical control of voluntary motor function
Rubrospinal	Descending	Red nucleus	Immediate	Alpha and gamma motor neurons	Facilitate flexors, inhibit extensors (for balance control)
Vestibulospinal	Descending	Vestibular nucleus	None	Alpha and gamma motor neurons	Facilitate extensors and inhibit flexors (for balance control)
Lateral spinothalamic *	Ascending	Free nerve endings	Immediate	Posterior central gyrus	Pain, temperature
Anterior spinothalamic tract *	Ascending	Free nerve endings	Variable levels	Posterior central gyrus	Light touch and pressure
Posterior column: fasciculus gracilis and cuneatus *	Ascending	Meissner's corpuscles, Pacinian corpuscles, muscle spindle, tendon organs	None	Posterior central gyrus	Discriminative touch, vibration sense, proprioception



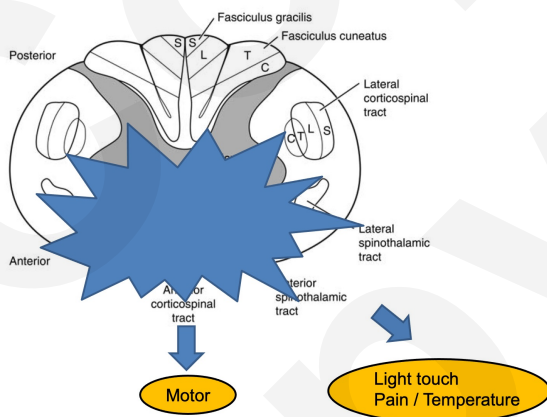
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90%

10%

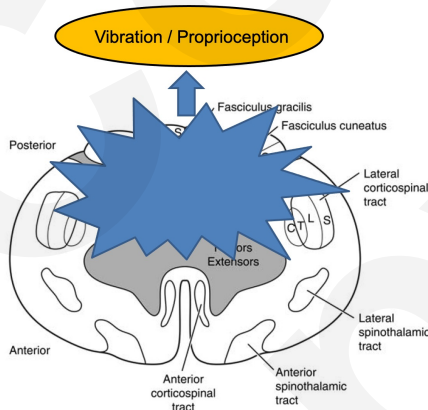


Figures 16.10, Tortora - PAP 12/e
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Anterior Cord Syndrome

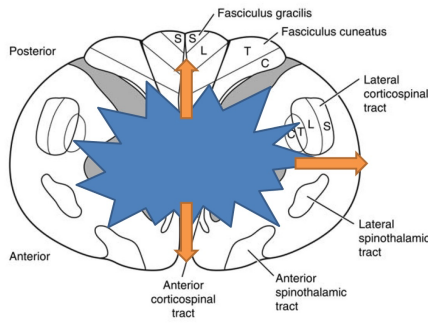
- Mostly vascular in origin
- Bilateral spastic paralysis
- Loss of pain, temperature, light touch & pressure with some degree of sacral sparing
- Preservation of proprioception, vibration 2 point discrimination



Posterior Cord Syndrome

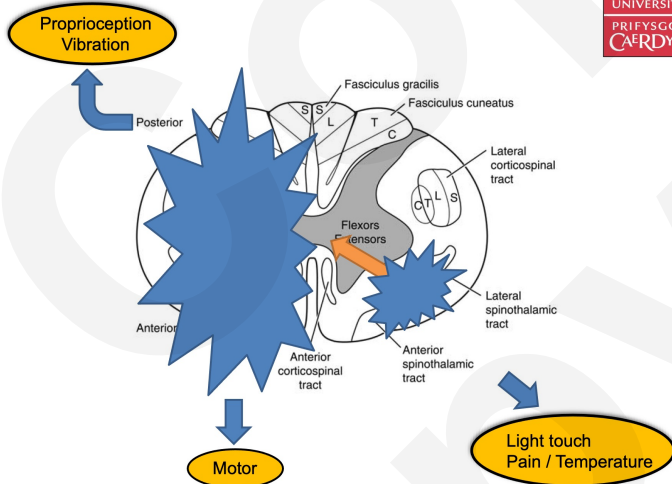
- Rare
- Loss of proprioception, vibration and 2 point discrimination
- Motor preservation

Central Cord Syndrome



- Cervical spondylosis
- Bilateral spastic paralysis
- Sacral sparing
- Upper limbs > Lower limbs – Cape distribution
- Recovery pattern LL > bladder > UL > sensory

Brown Sequard



- Usually penetrating injury
- Ipsilateral paralysis
- Dissociate anaesthesia - loss of ipsilateral proprioception / vibration & contralateral pain / temp / light touch / pressure
- Best prognosis for ambulation

Cauda Equina Syndrome

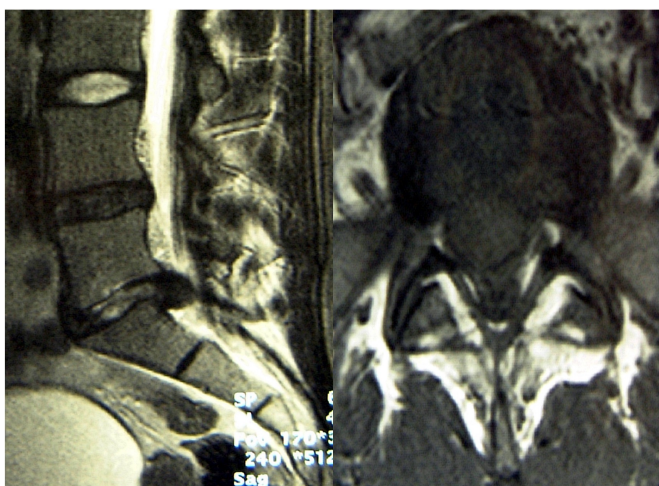
- A spectrum of low back pain, uni / bilateral sciatica, saddle anaesthesia and motor weakness in the lower extremities with variable rectal and urinary symptoms
 - Usually due to a canal filling disc compressing the entire cauda equina
 - Others - Tumour Infection Trauma
- Rare 2 / 1,000,000
- Disproportionately high medicolegal profile
 - Missed diagnosis £500,000

Cauda Equina Syndrome

SPHINCTERIC DISTURBANCE

- DO A RECTAL EXAM
- “Patient has no anus or surgeon has no fingers”
- “If you don’t put your finger in it you put your foot in it”





Cauda Equina Syndrome

- Outcome:
- The only modifiable factor is time to diagnosis and treatment
- Emergency MRI – refer - operate
- 75% reasonable recovery
- 25% poor



Commonest Tumour in Bone?

Metastases

Commonest Primary Tumour in Bone ?

Myeloma



Commonest Primary Bone Tumour ?

Osteosarcoma



Classification

- Primary
 - Spinal Column
 - Benign – Aneurysmal Bone Cyst, Giant Cell Tumour, Haemangioma, Osteoid Osteoma, Osteoblastoma
 - Malignant – Chordoma, Osteosarcoma, Chondrosarcoma
 - Extradural
 - Schwannoma, Meningioma
 - Intradural
 - Extradural – Schwannoma, Neurofibroma, Meningioma
 - Intramedullary – Ependymoma, Astrocytoma, Haemangioblastoma
- **Secondary – Spinal Metastases**
- Haematological – Lymphoma, Plasmacytoma or Myeloma

Mets - Indications Surgery

- Progressive / impending neurological deficit
- Spinal instability / collapse / deformity
- Paralysed <24hours
- Intractable pain (including paralysed >24 hours)
- Histological confirmation
- Growing tumour resistant to non-operative measures
- Relapse after / deterioration during radiotherapy
 - Spinal cord radiotherapy tolerance
- **It is far easier to keep a patient walking than make them walk again**

Mets

Surgical Candidate

- Indication present
- Patient willing to have surgery
- Prognosis > 3-4 months
- Patient is fit enough to have surgery
- Surgery is technically possible (ask the surgeon!)

Mets

Steroids

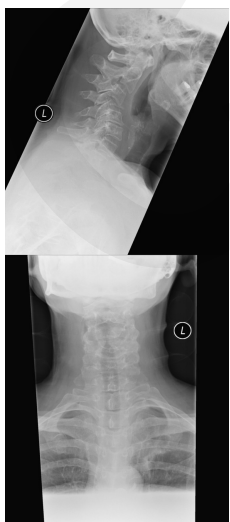
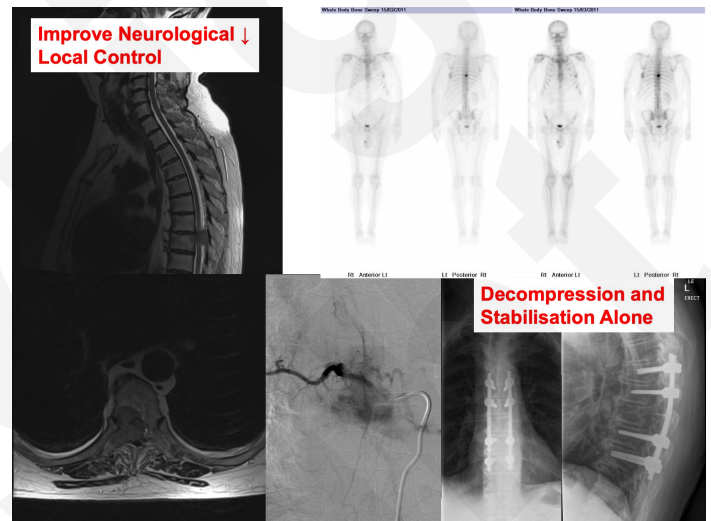
- Works by reducing oedema (cf trauma)
- 16mg Dexamethasone daily
- Load then 8mg bd
- Reduce dose over 5-7/7 post intervention
 - Neurology deteriorates – increase dose temporarily
- Monitor blood glucose
- Proton pump inhibitor (gastric cover)

Mets

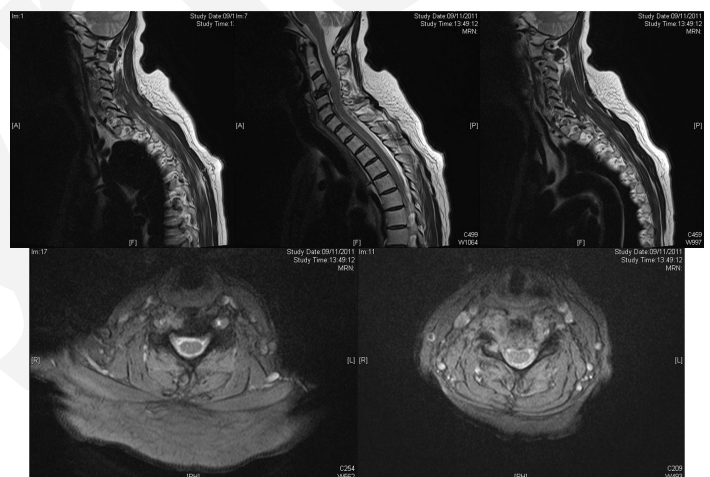
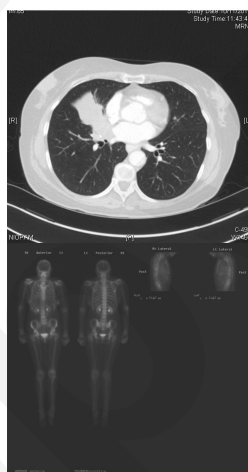
Prognosis

- Median survival MCCC – 6 months
- Ambulatory patients with radiosensitive tumours
 - Best prognosis
 - Likely to remain mobile

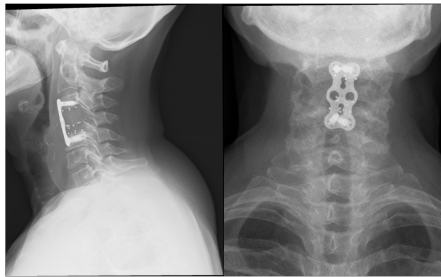
Mets



Pain Relief
Deformity Correction
Stabilisation
Prevent Neurological ↓



Surgical Site Infections



- Spinal SSI 0.7 – 12+%
- Increased morbidity, mortality and health care costs
- SSIs = 1/3 of HAIs
- CDC Jan 2014 SSI:
 - 30 days after surgery without instrumentation
 - 1 year with instrumentation
- Other classifications:
 - Acute (<3 weeks)
 - Subacute (3 weeks to 3 months)
 - Chronic (>3 months)

Infections



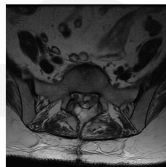
Jan2014

Surveillance Definitions

CDC/NHSN Surveillance Definitions for Specific Types of Infections



- Definitions:
 - Superficial Incisional
 - Deep Incisional
 - Organ / Space
- Localised stitch abscess and pin site infections not classified as SSIs (common)



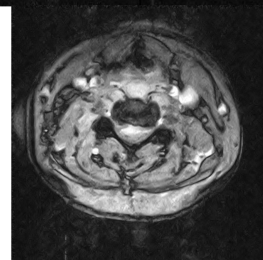
Infections

SSIs - Some Ps

- Patient
- Pathology (incl micro factors)
- Procedure
- Preoperative
- Perioperative
- Postoperative
- Proper
- Planning Preparation
- Prevents
- Piss
- Poor
- Performance

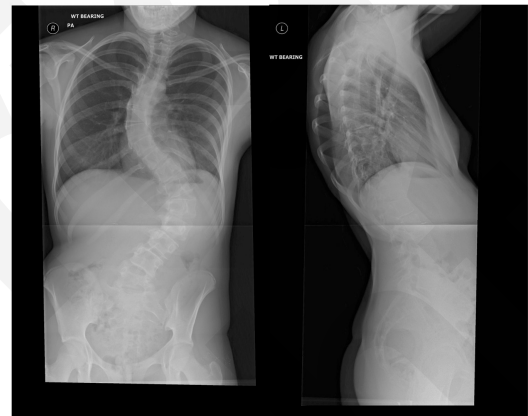
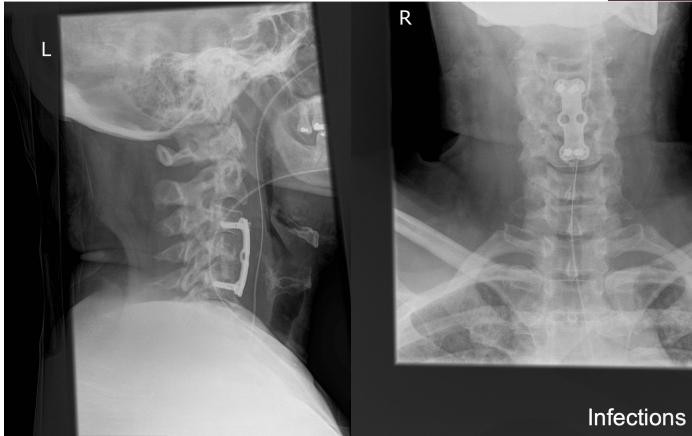


Infections



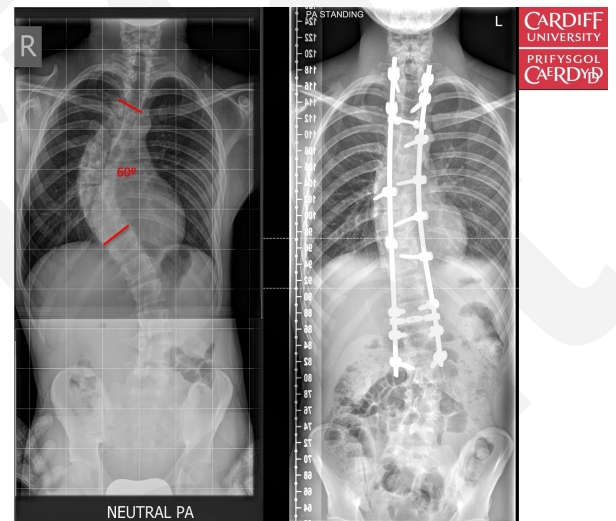
Infections

Scoliosis

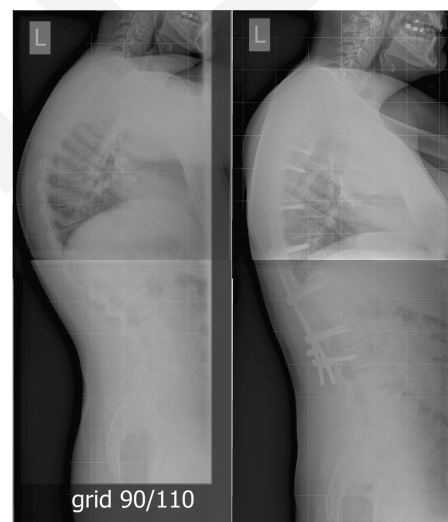
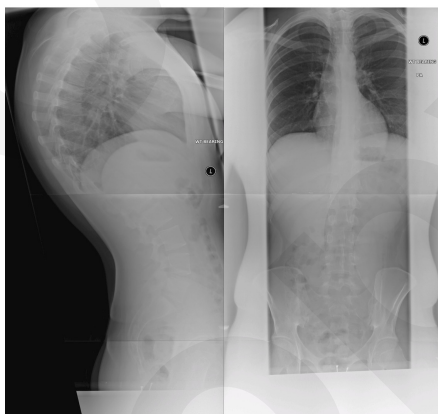


Objectives of Treatment

- Prevent curve progression
- Permit longitudinal growth
- Avoid cardio-pulmonary complications
 - Alveoli develop up to 9yrs age
 - Spinal (chest) deformity limits lung formation
- Facilitate sitting and handling (large curves)
 - Level shoulders and pelvis
 - Centre of Gravity over sacrum
- Cosmesis



Kyphosis





Overview

- Anatomy
- History
- Examination
- Radiology
- Low Back Pain
- Disc Prolapse / Cauda Equina Syndrome
- Stenosis / Spondylolisthesis
- Trauma / SCI
- Infection
- Tumour
- Scoliosis / Kyphosis

