SPINE SURGERY

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‘I Come In Peace’
Spinal Surgery : Pathology

• **Congenital**
  – Downs syndrome, Klippel Weil

• **Degenerative**
  – Cx Spondylosis
  – Lx Spondylosis

• **Inflammatory**
  – Rheumatoid arthritis
  – Ankylosing spondylitis

• **Trauma**
  – Falls
  – RTA

• **Neoplastic**
  – Benign
  – Malignant

• **Infective**
  – Tuberculosis
  – Bacterial
Spinal Surgery: Why do we operate?

- Pain
- Neurological deficit
  - Spinal cord
  - Nerve root

**INDICATIONS**

- Compression
  - Decompression
    - Anterior
    - Posterior
- Instability
  - Fusion
    - Bone
    - Instrumentation
    - Recombinant bone morphogenetic protein
BACK PAIN
Back pain: Statistics

- GP consultations: 14,000,000
- Hospital OP: 1,600,000
- X-rays: 1,500,000
- NHS physio: 1,000,000
- Osteo / Chiro: 700,000
- Admissions: 100,000
- Operations: 24,000
- Cost to BUPA: £7000,000.00!
Back pain: Economics

- Annual cost to NHS: £480,000,000
- Lost production: £3,800,000,000
- DHS Benefit paid: £1,400,000,000
- Total cost: £5,680,000,000
Acute LBP: Causes

- Degenerative
  - Musculo-ligamentous, discogenic, facet joint, osteoporosis
- Trauma
- Tumour
  - Intra/extradural, pathological #
- Infection
  - Pyogenic, TB, discitis, osteomyelitis
- Inflammatory
- Vascular
  - Aortic aneurysm
Diagnostic Triage

Simple Backache

• Presentation between ages 20 – 55
• Lumbosacral region: buttocks and thighs
• Mechanical pain
  • Varies with physical activity
  • Varies with time
• Patient well
• Prognosis
  • 90% recover from acute episode in 6/52
  • Significant recurrence rate
Common indicators from history and examination to cause concern

**History**
- **Age**
  - < 18yrs, > 55yrs
- **History of trauma**
- **Pain**
  - Radicular, nocturnal unremitting
- **Weight loss, Fever**
- **PMH**
  - Carcinoma
  - Immunosuppression
    - HIV
  - Systemic illness
    - Rheumatoid Arthritis
    - Ulcerative colitis
- **D.H**
  - Steroid therapy

**Examination**
- **Spine**
  - Structural Deformity
  - Pain in motion
- **Neurological**
  - Myeloradiculopathy
    - UMN / LMN
    - Sphincter disturbance
    - Gait disturbance
- **Peripheral**
  - Skin rash
  - Iritis
Examples of different methods for treatment of back pain

- Acupuncture
- Anthroposophic medicine
- Back school
- Balneotherapy
- Bed rest
- Behavioural therapy
- Body awareness therapy
- Biofeedback
- Cardiovascular fitness training
- Chiropractor
- Connective tissue massage
- Corsets
- Crutches
- Cupping
- Diet
- Disc injections
- Electrotherapy
- Epidural anaesthesia
- Exercises
- Facet blocks and denervation
- Healing
- Herbal medicine
- Holistic therapy
- Homeopathy
- Hydrotherapy
- Injections of saline, water, local anaesthetics
- Ionic modulation
- Iontophoresis
- Laser therapy
- Magnet therapy
- Manipulation
- Massage
- Medication
- Meditation
- Mobilisation
- Moxibustion
- Multimodal rehabilitation
- Nerve blocks
- Ointments
- Osteopathy
- Physiotherapy
- Relaxation techniques
- Spa treatment
- Stretching
- Surgery, various types
- Taping
- Therapeutic conversation
- Thermotherapy
- Traction
- Transcutaneous electrical nerve stimulation, high and low frequency
- Trigger point injections
- Ultrasound
- Vibrator
- X-ray therapy
- Zone therapy
Evidence based management of back pain

- **Good news**
  - Huge amount of literature with regards diagnosis and treatment of spinal pain

- **Bad news**
  - The vast majority is neither important nor valid
  - Distinct lack of RCT
  - I am afraid I don’t have the answers!

Population heterogeneity
- Genetics
- Sex
- Age
- Weight
- PMH
- Smoking history
- Occupation
- Social History
  - Socio-economic
  - Psychosocial
- Exercise history
- Expectations
- Treatment modality
- Outcome measures
Spinal Fusion

Indications

• Discogenic
• Spondylolisthesis
  – Degenerative
  – Pars interarticularis defect
• Segmental instability
  – post laminectomy
  – failed back surgery

Methods

Open / Minimal access

• Posterior
  – Interbody cages
  – Transpedicular screws
  – Disc replacement

• Anterior
  – Interbody cages
  – Anterior plates
  – Disc replacement
Techniques of Spinal Fusion
Spinal Fusion: Results


- Global patients’ satisfaction 82% instrumented, 74% non-instrumented (NS)
- Functional outcome (Dallas Pain Questionnaire) improved in both groups (NS)
- No difference in fusion rates
- Instrumented group significantly better in relation to daily activities if nerve root decompression undertaken
- Fixation increased operation time, blood loss, and early re-operation, and nerve root injury
SCIATICA
Diagnostic Triage
Nerve root pain

• Unilateral leg pain worse than LBP
• Radiation to foot or toes
• Radicular Sx or signs
  • SLR
  • Sensory disturbance
  • Motor weakness
  • Reflex changes
• Prognosis
  • 50% improved within 6/52
Lumbar disc prolapse: Lx Microdiscectomy
(Code v3370)

Indications for surgery

• Failure of Cx Mx
  • 85% improved within 5 – 8 weeks
  • Chronic / recurrent sciatica

• Neurological deficit
  • Cauda equina syndrome: Immediate (Rare)
    – Bilateral sciatica
    – Saddle anaesthesia
    – Sphincter disturbance
    – Motor weakness
  • Radicular: Early

• Social
  • Early surgery allows more rapid return to employment
Postoperative Management

- Mobilise same day
- Physiotherapy assessment and instruction
- Home 1 – 2 days post op
- Removal of skin clips 10 days
- Return to work dependant on occupation
- Exercise 4 – 8 weeks
Historical background

William Mixter
Investigations : MRI
POSITION

- Montreal / Wilson frame
- Lx Spine flexion to open interlaminar space
- Surgeon on same side as the sciatica
Incision and approach

- Midline incision
- Interspinous position
- Unilateral subperiosteal muscle strip
Lumbar Microdiscectomy
Right S1 nerve root decompression
Complications

• No improvement
• Recurrence of pain
  • Recurrent disc prolapse
  • Epidural fibrosis
• Failed back surgery syndrome
• Infection
  • Disc
  • Wound
• Neural injury
• Vascular injury
• CSF fistula
Outcome After Randomisation

- Discectomy was significantly better than conservative therapy at one year, but no significant difference in outcome at 4 and 10 years.

- Impaired motor function had a good prognosis regardless of treatment.

- Sensory deficit remained in 50% of all patients.
LUMBAR CANAL STENOSIS
Lumbar Canal Stenosis: Cauda Equina Compression

- **Neurogenic claudication**
  - radicular pain bought on by walking, cycling
  - OK
  - Usually L5 / S1
    - can be uniradicular but usually bilateral
  - Pain relieved by
    - Rest
    - Lumbar flexion
- **Examination**
  - Usually normal
  - Exclude peripheral vascular disease
- **Investigation**
  - XR: No value
  - MRI: Diagnostic
The Cervical Spine
Mechanical neck pain

- Acute Cervical Pain < 3/12 duration
- Chronic Cervical Pain > 3/12 duration
- Causes
  - Degenerative cervical spondylosis: 60 - 80% asymptomatic patients have Xray and MRI evidence of spondylosis
    - Cervical Myelopathy
    - Cervical Radiculopathy
    - Disc / osteophyte: single / multiple
    - Facet Joint
    - Musculoligamentous
  - Trauma
  - Tumour
  - Infection
  - Autoimmune
    - Rheumatoid arthritis, Ankylosing Spondylitis
Non-surgical treatment of acute neck pain

‘Numerous non-invasive treatments are used for acute and subacute neck pain. However, only a few of them have been evaluated in randomised controlled trials, and these provide little evidence that one treatment method is more effective than another’

Neck and Back pain
The Scientific evidence of Causes, Diagnosis and Treatment
Non-surgical treatment of chronic neck pain

‘Because of methodological problems and lack of RCT, we believe it is not opportune to make any recommendations in favour of any type of treatment for chronic neck pain at this time - there is no clear evidence that any form of treatment studied is particularly effective for patients with chronic neck pain’

*Neck and Back pain

*The Scientific evidence of Causes, Diagnosis and Treatment*
Management of acute neck pain

- Reassure
  - Explain the probable cause
  - Explain the natural history
    - 90% patients have Sx resolution within 2-12/52
- Continue physical activity
- Analgesia
- Cervical orthosis
  - If severe pain for limited period
- Physical therapy
  - Chiropractor
  - Osteopathy
  - Physiotherapy
Who a neurosurgeon might want to see

- Pain with progressive or persistent myeloradicular symptoms or signs
- Failure of conservative management
- ? Infection
- ? Malignancy
- Following discussion with Neurosurgeon, Orthopaedic spinal surgeon, Rheumatologist
CERVICAL DISC PROLAPSE
Diagnostic Triage : Nerve root pain

- Unilateral radicular brachalgia
- Dermatomal sensory loss
- Motor deficit
- Loss of reflex
- Positive L’hermitte sign
Diagnostic Triage: Myelopathy

- Progressive sensory loss in limbs

- Progressive weakness in arms and legs
  - Loss of function
    - Doing up buttons
    - Gait Disturbance

- Clinical signs of myelopathy
  - Increased limb tone
  - Limb weakness, loss of sensation in spinothalamic and dorsal columns
  - Hypereflexia
  - Extensor plantar responses
Surgical Management of the Cervical spine

• Indications
  • Instability
    – Degenerative
    – Trauma
    – Tumour
  • Compression
    – Spinal cord, nerve root
    – Failure of Cx Mx
    – Progression of neurological deficit

• Operative techniques
  – Anterior approach
    • ACD + / - Fusion
    • Vertebrectomy
  – Posterior approach
    • Laminectomy
    • Laminoplasty
Cervical disc prolapse
Anterior Cervical Discectomy
Anterior Cervical Instrumentation

INTERBODY CAGE

ANTERIOR PLATE AND GRAFT
TRAUMA
Odontoid peg fracture : Type 2

ODONTOID PED SCREW
57 yr old male: Progressive neck pain and hand weakness. Head injury age 12 diving into swimming pool.
C1 / C2 Atlanto - axial fixation
Pseudoarthrosis C2 Fracture

RANSFORD LOOP
Thoraco - Lumbar Fracture

TRANSPEDICULAR SCREW FIXATION
SPINAL TUMOURS
Spinal tumours

- **Extradural**: 55%
  - Metastatic
    - Lung, Breast, Prostate
  - Primary spinal tumours
    - Chordoma, Osteoid osteoma, ABC

- **Intradural**
  - Extramedullary: 45%
    - Meningioma, Schwannoma
  - Intramedullary: 5%
    - Ependymoma, Glioma, Dermoid

**Presentation**

- **Pain**
  - Radicular, nocturnal, persistent, Valsalva

- **Neurological deficit due to**:
  - Neuraxial compression
  - Vertebral column instability
    - Motor weakness
    - Sensory loss
    - Gait disturbance
    - Sphincter disturbance
Indications for surgical treatment

• **Diagnostic Bx**
  • Percutaneous CT guided Bx
  • Open Bx

• **Therapeutic Mx**
  • Failure of medical therapy : DXT
  • Pathological isolated unstable #
  • Progressive neurological deficit
Intradural Extramedullary Tumour

NEUROFIBROMA
Intradural Extramedullary Tumour: Neurofibroma

35 yr male with 18 / 12 persistent back and leg pain
Spinal intramedullary tumour: Astrocytoma
73 female (I A-S) with 3/12 progressive paraparesis
Extradural Tumour

LYMPHOMA
Intradural Extramedullary Tumour
MENINGIOMA
Intradural Extramedullary Tumour
NEUROFIBROMA
Floppy head syndrome
Occipto – cervicothoracic fixation
THANK YOU